Is the jury still out? The decision making processes of jurors.

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Abstract

The current thesis aimed to identify the process through which jurors reach their decisions, and to investigate the factors that may make the trial by jury process unfair for the individuals involved in criminal trials (i.e., the defendant, the prosecution and the defence). An initial literature review highlighted that two separate threshold models may be able to explain the processes (i.e., both rational and intuitive) through which jurors reach their decisions: 1) the Diffusion Threshold Model and 2) the Counter Threshold Model. The first study investigated which model of juror decision making was appropriate. In this quasi-experiment, 60 participants took part, and made verdicts (of Guilty, Not Guilty and Not Proven) over nine vignettes. Participants were asked to rate the evidence as either Guilty, Not Guilty or Not Proven, and to state how likely (from 1-100) they thought it was that the defendant was guilty. After all the evidence had been presented, participants were asked to give a verdict. Then, participants were asked to state the last piece of evidence they needed to reach said verdict (symbolising the threshold). The results suggested that the Diffusion Threshold Model best explained the decision processes of jurors. The second study investigated if the reaching of a threshold caused confirmation bias and/or evidence distortion to occur, and if information interaction allowed said threshold to be reached. Each of the 108 participants listened to one vignette, which contained an opening statement, eight pieces of evidence (four prosecution and four defence) and two closing statements (one prosecution and one defence). Participants were asked to state their perceived likelihood of guilt in regard to the defendant after each piece of evidence. After all the evidence had been presented, participants were asked to give a verdict and to state the last piece of evidence they needed to give said verdict (symbolising the threshold). The results showed that information integration occurred throughout a trial, but the reaching of a threshold promoted confirmation bias. The third study looked to investigate potential factors that may have an impact on juror perceptions

of guilt and the verdicts given by jurors. In this study, 128 participants listened to two vignettes. The vignettes were manipulated, and counterbalanced, for both the anchor (strong versus weak initial piece of evidence) and number of verdicts available (two-verdicts were available or three-verdicts were available with the additional Not Proven verdict) factors. Participants also completed the Pre-trial juror bias questionnaire (PJAQ), which allowed participants to be categorised according to their bias. The results highlighted that pre-trial biases did have an impact on the belief of guilt given, and that jurors in a three-verdict system were less likely to give a Not Guilty verdict in comparison to jurors in a two-verdict system. The findings in the current thesis have suggested that the Diffusion Threshold Model can adequately explain the process through which jurors reach their decisions, that individuals integrate information until they reach an appropriate threshold, that the reaching of a threshold can promote confirmation bias, and that extra-legal factors, such as pre-trial biases, can have an impact on juror perceptions of guilt. The results also highlighted that certain factors (i.e., thresholds that promote confirmation bias) may make the trial by jury process unfair for individuals (i.e., the defendant) who are involved in a criminal trial.

Signed Declaration

I state that the work has not been submitted for any other degree or professional qualification. I state that the thesis is the result of my own independent work. Two published pieces of work have arisen from this PhD thesis: 1) discussion piece; and 2) a chapter in a fact book. The discussion piece is titled: "Heuristics: The good, the bad, and the biased. What value can bias have for decision makers? ". The chapter is titled: "Decision Making Process of Jurors" and is in a book named: *Factbook: Psychology and Law*". One media article has also come out of the current thesis; the piece was written for the Scotsman and was named: "Jury still out on merits of the Not Proven verdict".

Kindest Regards,

L.J. Curley.

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List of Abbreviations

1. TTB = Take the Best Heuristic.

2. ANOVA = Analysis of Variance.

3. GEE = Generalised Estimating Equation.

4. Estimated Marginal Mean = EMM.

5. PJAQ = Pre-trial Juror Attitude Questionnaire.

6. JBS = Juror Bias Scale.

7. DNA =deoxyribonucleic acid.

8. IV = Independent Variable.

9. DV = Dependent variable.

10. SCTS = Scottish Courts and Tribunals Service.

11. CPS = Crown Prosecution Service.

12. UN = United Nations.

13. QLUIMC = The Quasi-Likelihood Under Independence Model Criterion.

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Curley, L. J. (2017, April 3rd). Decision making theory and its implications for policing [Blog post]. Retrieved from: https://bscpolicingnetwork.com/2017/04/03/decision-making-theory-and-its-implications-for-policing/. Republished in Policing Insight.

Curley, L. J. (2017, January 18th). To win a Scottish indyref2, yes side must learn lessons of Brexit victory. *The Conversation*, retrieved from: https://theconversation.com/to-win-a-scottish-indyref2-yes-side-must-learn-lessons-of-brexit-victory-71446. Republished in Flipboard, World News Yahoo News.

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1. Chapter One: Introduction

It has been estimated that 107,244 jury trials occurred in the Crown Court within the United Kingdom in 2011-2012 (Crown Prosecution Service [CPS], 2012). This represents a large number of people, both victims and defendants, who have had their lives changed indefinitely based on a decision made by legal novices (i.e., jurors). It is therefore of the utmost importance that the decisions being reached by these jurors are as legally just and fair as possible. However, before amendments to jury and juror-related processes can be made based upon assumptions of "fairness", research which establishes how jurors reach verdicts and the decision making processes behind these outcomes is needed. Only this kind of inquiry into how legal novices make decisions can ensure that the legal system is fair and just for the individuals who are involved in Crown Court cases. Further, if research is not continued into the factors that influence juror decision making and the processes through which jurors reach verdicts, then the state is failing to provide defendants, and victims, with a fair trial, as the state cannot define a fair trial without such research.

When a miscarriage of justice has occurred, the state (i.e., the Crown/prosecution) has failed both the defendant and the victim. There have been many examples of injustice throughout the years, such as Victor Nealon who spent 17 years incarcerated for an attempted sexual assault that he did not commit (Goldhill, 2014). It was only discovered after private DNA testing that the genetic material found on the victim's clothing did not belong to Victor Nealon (Goldhill, 2014). One potential way to decrease the likelihood of a miscarriage of justice is to study the evidence presented in the courtroom. Many areas of the courtroom cannot be improved, however. For example, the testimony of witnesses will always be vulnerable to confabulations (Loftus & Hoffman, 1989) and physical evidence, such as DNA, although accurate, is mostly circumstantial (Goldhill, 2014) and

is not fool-proof (Aitken & Taroni, 2004) – or conclusive. This suggests that a potential way to reduce miscarriages of justice may be to research the naturally occurring decision making processes and biases of jurors, as knowledge of said biases and processes may help to increase the effectiveness and fairness of the trial by jury process. Further, factors such as pre-trial biases can impede on the fairness of the trial by jury process through biasing jurors towards or against the defendant (Lecci & Myers, 2009). It is important that legal decision makers do not make biased (or sub-optimal) judgments as biases can lead to error (Tversky & Kahneman, 1974), and that the legal system does try to investigate instances that might cause biased juror decision making, as otherwise the legal system is not in alignment with article 6 of the European Convention of Human Rights (Council of Europe, 2010), which constitutes that defendants be given the right to a fair trial.

The overarching aim of the current thesis is to identify the process through which jurors reach their decisions. The researcher also aims to investigate the factors that may make the trial by jury process unfair for legal actors (i.e., the prosecution and the defence). Initially, the thesis will begin with a chapter (i.e., Chapter Two) that presents a literature review on juror decision making and decision making models. This chapter will first define what a 'juror' is, thereby providing an operational understanding for use throughout the thesis. This chapter will then discuss the Scottish Legal Environment and previous juror research, and will conclude with a discussion around the psychology of human judgment and decision making. Chapter Three will present an empirical investigation of juror decision making within a Scottish context, and will discuss the model of decision making that best explains the data that were collected. Next, Chapter Four will utilise the Diffusion Threshold Model of decision making and will investigate through a quasi-experimental design the implications of said model in relation to confirmation bias within jurors. Chapter Five will study the effects that factors, such as

pre-trial bias, the number of verdicts available (two versus three) and initial anchors (strong versus weak), have on both the perception of guilt surrounding a defendant and the final verdict that is reached by individual jurors. The thesis will end with a general discussion that will discuss the limitations of the current research and the practical and theoretical implications of this thesis.

2. Chapter Two: Literature Review

2.1. What is a Juror?

A juror can be defined as a legal layperson who makes a decision on whether or not a charge(s) has been proven based on the information in court (Scottish Courts and Tribunals Service [SCTS], 2015). The role of the juror is to listen to the information provided in court; they are also asked to comply with the instructions given from the judge. Jurors are informed that they should only use information provided to them in the courtroom and that they should only make a decision once all of the information has been provided (SCTS, 2015). Furthermore, jurors are asked to be completely rational and omit all biases; the current programme of research will investigate whether this occurs or not.

A collection of jurors makes up a jury (SCTS, 2015), with jurors being rotated and selected from the public, using the electoral register, in order to reduce the effects of institutional biases (Powell, 1966). Many of the customs behind jurors and juries have their origins in tradition and culture. Juries originated in England as a logical alternative to trial by ordeal (i.e., torture) as a way of deciphering the truth (Powell, 1966). There are national differences in regard to the number of jurors that constitute a jury: the Anglo-American system uses 12 jurors (Powell, 1966) and the Scottish system uses a maximum of 15 and a minimum of 11 jurors (SCTS, 2015), which allows trials to continue despite juror dropouts and absenteeism.

A jury is commonplace in adversarial legal systems, which includes Scotland, the rest of the UK and the United States of America (Marsh, 2002; Moohr, 2004; SCTS, 2015). In this system, judges see both the prosecution and defence as equal, and allow each stance to present their case; 'impartial' jurors then evaluate the evidence and make a decision (Moohr, 2004). It is believed that by allowing lawyers the opportunity to compete, a fuller and more truthful picture is presented to the jurors (Moohr, 2004). In an inquisitorial legal

system, which often occurs in Western Europe, 'fact-finding' is focussed upon, more so than the trial dynamics, and said system does not use jurors (Moohr, 2004). The adversarial system involves individuals outside of the state such as the defence and jurors (Moohr, 2004). The remainder of the current thesis will focus upon the adversarial system, as this is the context in which the thesis's programme of research is based.

Within the adversarial system, two-verdicts are normally open to the jurors: Guilty and Not Guilty (there are exceptions to this, which will be discussed in the following section). A juror should give a Guilty verdict if they believe beyond reasonable doubt that the defendant is guilty (Park, Seong, Kim, & Kim, 2016). However, a Not Guilty verdict may be given on two occasions. First, if evidence shows proof of innocence, and, second, if the evidence did not provide enough proof to convict (Jackson, 1998). These verdicts allow jurors to communicate to the Crown what they have interpreted from the evidence, and what outcomes they believe should be given. For instance, the appropriate outcome of a Guilty verdict may be incarceration, whereas the appropriate outcome of a Not Guilty verdict is for the individual's charges to be dropped. A jury is, therefore, not only a legal construct that decides guilt: it also provides responsibility and power to the public by letting them communicate to the state whether a defendant is Guilty or not (Powell, 1966).

Investigations of jury decision making lose important information surrounding the cognition of individual decision makers, however. It is important to establish how individuals use and evaluate information, which legal factors have an impact on individual decision making processes and which individual biases may plight the courtroom. It is therefore vital to investigate how jurors reach individual verdicts before the complex procedure of jury decision making can be adequately studied.

2.2.   The Scottish Legal Environment

The Scottish legal system is very different from other jurisdictions (Broadbridge, 2009). For instance, within the Anglo-American legal system only the verdicts of Guilty and Not Guilty are available (Jackson, 1998). Therefore, if the evidence does not provide proof beyond reasonable doubt that the defendant committed the accused illegal act, then a Not Guilty verdict is appropriate (Jackson, 1998). However, within the Scottish legal system, three-verdicts are available: Guilty, Not Guilty, and Not Proven. It was in the early 18th century when this system evolved, and it has been used ever since (Broadbridge, 2009). From a legal perspective, the Not Proven verdict has the same outcomes as the Not Guilty verdict (i.e., no custodial sentencing).

Some have argued that the Not Proven verdict reflects more realistic decision making (Laudan, 2010), as jurors cannot always reach a point where they are confident in using either of the Anglo-American verdicts. Therefore, the Not Proven verdict supplies a comfortable middle ground for Scottish jurors and judges (Broadbridge, 2009). Nevertheless, the extra acquittal option of Not Proven has been extensively criticised, and was named the "bastard verdict" by Sir Walter Scott (1827, as cited in Broadbridge, 2009). Additional criticisms include that no operational definition is given (Smithson, Deady, & Gracik, 2007), and that defendants who are handed down a Not Proven verdict may suffer scrutiny from the general public, as the jury did not decide that the defendant was definitely not guilty (Broadbridge, 2009). Consequently, it is important to identify which decision mechanisms promote a Not Proven verdict and what allows a Not Guilty verdict to be chosen.

There are, on occasion, other verdict options available, such as the Guilty but Mentally Ill verdict (used in American states such as Alaska and Michigan; McGraw, Farthing-Capowich, & Keilitz, 1985; Smithson et al., 2007). However, the third verdict option

mentioned above is available in certain circumstances, whereas the Not Proven verdict is readily available in all Scottish cases. Consequently, this particular third verdict always has the potential to shape the decision making outcomes and processes of Scottish Jurors, which highlights the need for further exploration into the effects of the Not Proven verdict.

Previous research has found that between one-fifth and one-third of acquittal verdicts given by Scottish jurors are Not Proven ones (Duff, 1999; Scottish Office, 1994), and that 71% of acquittal verdicts given in homicide cases in Scotland are Not proven verdicts (Hope, Greene, Memon, Gavisk, & Houston, 2008). However, what researchers are interested in is what causes this verdict to be given over other verdicts. Smithson et al. (2007) found that task difficulty was the only constant predictor of the Not Proven verdict. This suggests that jurors use the Not Proven verdict when a clear verdict cannot be determined (i.e., in cases where there is high noise; Ratcliff & Smith, 2004). This may be because the difficulty of the task, or ambiguity of the evidence, did not allow a beyond reasonable doubt threshold to be reached, thus meaning that jurors could give the default option of Not Proven verdict (Smithson et al., 2007).

Hope et al., (2008) proposed that the Not Proven verdict was a second-class acquittal. They focussed on how the strength of the evidence may affect the rate at which Not Proven verdicts were given. Hope et al. (2008) found that in the strong and weak evidence conditions, there was no significant association between the number of verdicts available and Guilty verdicts. However, in the moderate strength condition, there was a significant reduction in the number of Guilty verdicts given when the Not Proven verdict was available in comparison to when it was not (Hope et al., 2008). In addition, it was found that Not Guilty verdicts were given less frequently in the three-verdict condition in comparison to the two-verdict condition. This highlights that when a Not Proven verdict is available, it allows jurors to show that they are not certain of guilt or innocence, and

can therefore give a more appropriate verdict. This has implications for real world justice, in that the Not Proven verdict may stop false convictions and false acquittals. The research by Hope et al. (2008) also suggested that juries might use the Not Proven verdict in order to reach a compromise.

In summary, the current thesis aims to investigate juror decision making (mostly) within a Scottish context, as the Scottish system has not been as widely studied as its Anglo-American counterpart, which causes problems in relation to generalising research findings to the Scottish legal system. Nevertheless, previous juror decision making research, which has been studied within the Anglo-American context, will now be discussed in the next section, in order to outline former attempts at explaining the decision processes of jurors.

2.3. Previous Juror Research

There has been a wealth of research on juror decision making, one influential juror decision making model is known as the Story Model (Pennington & Hastie, 1992). The Story Model proposes that jurors create stories three different elements evidence from the trial: awareness of similar cases; and schematic information that relates to why someone would perform a certain action (i.e., motivations and personality; Pennington & Hastie, 1992) from. Stories are often subdivided into elements called episodes, these episodes may relate to specific events, and are used to highlight the motivations and intentions behind certain actions that may have been committed by the defendant (Pennington & Hastie, 1992).

Multiple stories can be created throughout a case and are selected according to certainty principles (Pennington & Hastie, 1992; Simon, 2004). The first certainty principle of note is *coverage*: a story is selected if the evidence presented in a trial fits the story. Second,

stories are selected if they are *coherent*, which relates to how consistent, complete and plausible the created narrative is. Finally, the amount of confidence a juror has in their created story is determined by how *novel* the story is (MacCoun, 1989; Pennington & Hastie, 1992; Simon, 2004). The verdict that best fits with the chosen story is then selected.

The Story Model provides a rich, narrative based perspective of juror decision making that contrasts to mathematical models (Simon, 2004), which will be discussed in the 'Rational decision making' section. It is a comprehensive and individual approach to describing juror decision making. However, it is difficult to make predictions using the Story Model (MacCoun, 1989; Simon, 2004), and said model assumes that jurors do not make a decision until all the evidence has been provided; Carlson and Russo (2001) have since challenged this assumption and have provided evidence to the contrary.

Other literature suggests that coherence-based reasoning models may best explain juror decision making (Simon, 2004). Simon (2004) suggested that decisions are made efficiently when based on "coherent mental models" (p. 516). Mental models are a snapshot of the current task and includes all the information/variables relating to a task; it is believed that a coherent mental model is reached when the decision maker evaluates the favoured alternative to be confirmed by strong supporting evidence and the opposing alternative to only be favoured by weak evidence (Simon, 2004).

Simon (2004) proposed that information becomes coherent during the decision process through the constraint satisfaction mechanism, with pieces of evidence that are linked to one another continuing to interact and pieces of information with no real strong relationship becoming less associated over time, and thus discounted. This process changes the mental model to be in favour of the verdict that the interacting/activated information supports. The option that is preferred also has an impact on how the

information is evaluated, as the current mental model influences how new information is incorporated into said model; therefore, this effect is bi-directional (Simon, 2004).

One criticism of coherence-based reasoning in regard to juror decision making is that said model assumes that decision makers holistically create coherent mental models (Schweizer, 2013; Simon, 2004). Other models, however, such as Bayesian analysis would suggest that evidence is evaluated atomistically (Schweizer, 2013). In other words, evidence is evaluated independently in relation to its potential *"probative value"* and then said values are integrated in accordance with Bayesian analysis (Schweizer, 2013, p.1). This atomistic approach of Bayesian analysis is favoured over the holistic approach of coherence models, as it retains the uncertain nature of criminal trials and fights against false positives (Schweizer, 2013). Coherence-based reasoning focusses largely on the unconscious processes that lead to coherence, rather than conscious factors that may influence decision making outcomes (Simon, 2004).

Previous juror researchers have also investigated how juror, defendant and victim demographics influence verdict choice. For instance, Sommers and Ellsworth (2000) investigated the interaction between juror race and defendant race (both black vs. both white). They found that when race was made salient, the defendant's race did not influence white juror perceptions of guilt. However, when race was not made salient, white jurors perceived black defendants as being more aggressive, less innocent and more violent that white defendants (Sommers & Ellsworth, 2000). Black jurors were shown to have a same-race leniency effect, thus highlighting that race is normally salient for black jurors when the defendant is also black (Sommers & Ellsowrth, 2000). This research shows that unconscious racial biases may affect juror decision making, but when race is made obvious to white jurors, they can control this bias. Therefore, any model of juror decision making should be able to explain both conscious (rational) and unconscious (intuitive) decision making (Nygren & White, 2002). The two models previously

described cannot do this, however, with the story model focussing too much on the former and coherence based reasoning models paying too much attention to the latter (Simon, 2004).

Esqueda, Espinoza and Culhane (2008) investigated the interaction between defendant race, socioeconomic status (SES) and crime status on sentencing recommendations, perceptions of guilt and verdict outcomes. It was found that European American mock jurors gave more guilty verdicts, longer sentence recommendations and higher beliefs of guilt to lower SES Mexican American defendants than to both Mexican American defendants of high SES and European American defendants; these effects occurred regardless of crime type (Esqueda et al., 2008). Therefore, it is evident that juror decisions are biased by non-rational factors such as race.

Quas, Bottoms, Haegerich, and Nysse-Carris (2002) studied the effects that defendant, victim and juror gender have in child sexual assault trials. Jurors read vignettes of a sexual assault case where a defendant (male vs. female) was accused of molesting a 15 year old (boy vs. girl; Quas et al., 2002). It was found that female jurors were more likely to favour the victim in comparison to their male counterparts (Quas et al., 2002). The results also showed that female defendants were perceived more leniently than male defendants were, particularly when the victim was a boy and the juror was male (Quas et al., 2002). Gender, therefore, seems to have a biasing effect on juror judgments.

The three studies mentioned above have vast implications for the courtroom, as they suggest that gender, race, and SES bias juror decision making. However, these studies do not investigate the decision making processes behind how jurors reach verdicts, and therefore traditional decision science research will be consulted in the following section. In addition, the studies above were studied within the Anglo-American two-verdict

system, and consequently there is a gap of knowledge relating to how pre-trial biases have an effect on jurors within the three-verdict Scottish legal system.

The current thesis aims to identify a model of decision making that may explain the processes behind how jurors reach verdicts. However, before such a model can be discovered/tested, a review of previous decision making models, which will be examined over the remaining part of the current chapter, is necessary. This review will begin with a definition of what constitutes a decision, and then a discussion surrounding each of the three main paradigms of decision making, and their associated theories and models, will be presented: 1) rational decision making; 2) the heuristics and biases programme; and, 3) bounded rationality, which incorporates fast and frugal heuristics. Finally, the chapter will end by outlining the threshold model of decision making, which may explain both rational and intuitive judgments.

2.4.   What is a Decision?

To understand the process through which jurors make decisions better, it is necessary to consider the wider literature on human judgment and decision making. Classical and modern decision science literature will now be discussed to provide empirical underpinnings to the current thesis approach.

A decision is a choice that an individual has to make between at least two alternatives; the decision maker may be motivated to obtain, or elude, a certain outcome (Glöckner & Betsch, 2012; Gold & Shadlen, 2007; Schall, 2005). Further, when faced with a choice, an individual will carry out a task and should be able to give some explanation for their decision (Schall, 2005). Although it may be clear to the layperson what a decision is, the ways in which individuals use different decision making strategies to reach certain outcomes, and how complex these strategies can be, is less clear.

Nygren and White (2002) suggest that the strategies that individuals use for making decisions can be split into conscious (rational) and unconscious (intuitive) ones. This view of two separate systems (or a continuum between two extremes) for decision making has been supported throughout the decision making literature (Cader, Campbell, & Watson, 2005; Dhami, Hertwig, & Hoffrage, 2004; Evans, 2003; Fenton, Neil, & Lagnado, 2013; Gigerenzer & Goldstein, 1996; Kahan, 2015; MacCoun, 1989; Manktelow, 2004; Newell, Weston, & Shanks, 2003; Sanfey & Chang, 2008; Tversky & Kahneman, 1981). There are many differences between conscious strategies of decision making and unconscious approaches.

When individuals are employing a more rational system of decision making they are deliberative, conscious, and their thought processes are based in language (Sanfey & Chang, 2008). Similarly, some decision making researchers have suggested that when individuals are thinking rationally they use subjective probabilities, weight evidence and attach utilities to outcomes (Dhami et al., 2004; Fenton et al., 2013; Kahan, 2015; MacCoun, 1989; Newell, et al., 2003; Tversky & Kahneman, 1981). Conversely, when individuals are more intuitive in their decision making, they are said to be using more unconscious and automatic processes, which are influenced by emotions and learned strategies (De Martino, Kumaran, Seymour, & Dolan, 2006; Gigerenzer & Goldstein, 1996; Sanfey & Chang, 2008; Tversky & Kahnman, 1974). These unconscious processes of decision making are called heuristics, and are 'cognitive short cuts' that allow more efficient decisions to be made, in comparison to the rational approach described above (Gigerenzer & Goldstein, 1996).

Heuristics have been a source of controversy over the years, with some researchers saying that they promote biases (e.g., Tversky & Kahneman, 1971, 1974, 1981) and others arguing that they are as accurate as more rational models of decision making (e.g., Gigerenzer & Goldstein, 1996). Accuracy here relates to situations where there was a

definite correct and incorrect outcome (e.g., deciding over which city had the largest population); other environments do not always have a 'correct' answer (i.e., the legal system). The following literature review will discuss the recent history of decision science, which includes debates surrounding the accuracy of heuristic decision making (Dawes, 1979; Dhami & Harries, 2010; Gigerenzer & Goldstein, 1996), ecological validity (Simon, 1956), and attempts at unifying intuitive and rational processes within a more global model (Lee & Cummins, 2004; Newell & Lee, 2010).

2.5. Rational Decision Making

Initially, philosophers, psychologists, mathematicians and economists viewed individuals as being highly rational and they treated the human mind as a "Laplacean Demon" (Gigerenzer & Goldstein, 1996, p.650). This means that limitations of the mind, such as limited capacity, cognitive overload and time restraints, were not taken into account (Gigerenzer & Goldstein, 1996). Humans were thought to have extraordinary decision making abilities, and used logic, rationality and probabilities to work out what was the most appropriate alternative to take in relation to a choice (Gigerenzer & Goldstein, 1996).

Many models use this rational method of decision making to establish how individuals come to reach decisions. One such model is the Bayesian model (Arkes & Mellers, 2002; Gigerenzer & Goldstein, 1996; Nygren & White, 2002), which evaluates evidence in a sequential manner (Cummins, 2012; Gigerenzer, 2002; Kahan, 2015; Simon, 2004). It is probabilistic, in that it works on the basis that the prior probability and conditional probability (which is based on evidence) allow a prediction or a decision to be made (Cummins, 2012; Gigerenzer, 2002; Kahan, 2015; Simon, 2004). This model also assumes that information is processed in a linear way (Cummins, 2012; Simon, 2004).

Consequently, 'Bayesianists' propose that each piece of information is evaluated (i.e., given a probability) independently in a sequential fashion until a judgment is finally reached using all of the available information (Cummins, 2012; Kahan, 2015; Lee & Cummins, 2004; Simon, 2004). In other words, Bayesian modelling suggests that decision makers integrate all of the information provided when they are making a decision, previous research from Kaplan and Miller (1978) did highlight that juror integrate information in order to reach a verdict. However, the model is unidirectional (Simon, 2004) and therefore assumes that the final decision cannot change how certain pieces of evidence have been analysed.

The Bayesian model of decision making is viewed by many decision scientists as an optimal model and has been seen by some as the benchmark of human decision making (Cummins, 2012; Finkelstein & Fairley, 1970, cited in Goldman, 2003; Gigerenzer, 2002; Simon, 2004). The aim of Bayesian theorem is to find the posterior probability, which is the probability that a hypothesis is correct based on observations (Fenton et al., 2013). The posterior probability allows the prior probability (probability of event A occurring without any evidence) to be updated through new evidence (Fenton et al., 2013). The posterior probability is symbolised by P (A/B), as it gives the probability of event A happening based on the fact that event B has happened. In addition, the prior probability is needed, symbolised by P (A). Another conditional probability is also needed to carry out Bayesian analysis (P (B/A)), this probability investigates the probability of event B occurring given that event A has happened (Cummins, 2012; Kahan, 2015). Finally, the last probability needed relates to the probability of a positive result of the observation being found (P (B); Fenton et al., 2013; Kahan, 2015). The above probabilities allow the following equation to be displayed:

$$P (A/B) = \frac{P (B/A) \, P (A)}{P (B)}$$

Bayesian analysis can be used when making decisions/predictions in legal/forensic environments. For example, when a homicide is committed and DNA that matches the defendant's is found on the murder weapon, Bayesian analysis can be used to calculate the probability of the DNA found being the defendant's DNA. If 1% (prior probability: P (A)) of the population could match the DNA found, and if the DNA analysis sensitivity is 90%, based on a population where the forensic analysts knew that the target DNA was the defendants (P (B/A)), then how likely is it that the DNA found is the defendants based on a positive match? If the prior probability of the defendant matching the DNA found is .01, then this means that .99 of the population could not match the DNA found, and if the test sensitivity is .90 accurate, the test is .10 inaccurate (a false positive). These numbers will help to find the probability of finding a positive match (P (B)). The Bayes equation can now be supplemented by the example probabilities:

$$P (A/B) = \frac{P (.90) (.01)}{(.01) (.90) + (.99) (.10)}$$

This equation then leads to the following division:

$$P (A/B) = \frac{.009}{.108}$$
$$P (A/B) = .083$$

The probability that the DNA found is the defendant's based on a positive match is .083 (8.3%).

Bayesian analysis is the most logical way of deciding upon an outcome (Busemeyer & Townsend, 1993; Machina, 1982), as it takes into account all of the different pieces of information and integrates them in a mathematical fashion (i.e., compensatory processing

(Montgomery, 1983). It is therefore deemed that Bayesian modelling is rational, and how decisions should be made (Busemeyer & Townsend, 1993; Machina, 1982). However, this does not mean that decisions are made in this way (Simon, 1956).

There are many criticisms of rational decision making models such as Bayesian modelling. One potential criticism of the Bayesian model is its complexity (Thagard, 2004), as the model analyses all the information available in particular scenarios, and this makes it unlikely that people acting as jurors will use this type of decision making strategy when analysing information. This is simply because of the cognitive costs and time limitations associated with such an in-depth analysis of available information (Bröder & Schiffer, 2003b). Consequently, Bayesian theorem may not mirror decision making processes that occur in real life (Pennington & Hastie, 1981).

In addition, analysing all of the information available may make it unlikely that important information will be used when making a decision (Tordesillas & Chaiken, 1999). If all the information is processed, the significance of certain pieces of information may be lost; thus, the quality of information may be more important than the quantity used (Gigerenzer & Goldstein, 1996). It could also be said that the Bayesian model is too focussed on internal mechanisms of decision making, and does not focus enough on the environment in which a decision takes place (MacCoun, 1989). In addition, Bayesian models have been found to be quite poor at describing juror verdict making (Pennington & Hastie, 1983). A final criticism of rational decision making models is that heuristics have been found to have comparable accuracy rates, suggesting that rational decision processes are not needed to reach an accurate judgment (Gigerenzer & Goldstein, 1996). This section proposes that within a juror decision making context, there may be more appropriate, less rational, models of decision making that may have more ecological validity in comparison to Bayesian models. These alternatives will now be discussed.

2.6. Heuristics and Biases

Tversky and Kahneman (1974, 1981) took a different approach to decision making; they accepted that rational models, such as the Bayesian model, were optimal and preferred, but they believed that human decision making was not always rational. In their pivotal work, Tversky and Kahneman revolutionised the field of decision science by suggesting that their new heuristics allowed individuals to make judgments which were quick and easy (Gigerenzer & Goldstein, 1996; Sanfey & Chang, 2008), yet *potentially* biased. As previously mentioned, a heuristic is a rule of thumb technique that allows individuals to make decisions without using heavy cognitive computation, thus easing cognitive load (Gigerenzer & Goldstein, 1996; Tversky & Kahneman, 1974, 1981). There are three 'classic' heuristics that were originally proposed by Tversky and Kahneman (1974, 1981): 1) *representativeness*; 2) *availability*; 3) and, *anchoring and adjustment*. These heuristics will now be discussed.

The representativeness heuristic relates to people ignoring base rate information, and instead incorporating context and preconceived information when forming their judgments (Tversky & Kahneman, 1974, 1981). This leads to stereotyping when making judgments, thus causing the decision maker to be biased (Korobkin & Ulen, 2000; Tversky & Kahneman, 1974, 1981; Walters, Kroner, DeMatteo, & Locklair, 2014). For example, in a previous juror decision making study by Jones and Kaplan (2003), it was found that when the defendant's race was consistent with a crime stereotype (black defendant charged with grand theft auto in comparison to black defendant charged with a white collar crime) that jurors gave harsher verdicts, and used less information, suggesting that stereotyping may lead to negative racial biases.

In addition, Bodenhausen (1988) found in a juror decision making experiment, which focussed on a criminal assault, that discrimination occurred because of biased evidence

evaluation, as stereotype-consistent information was processed more comprehensively than information that conflicted with the stereotype. The impact of stereotyping was compared by presenting the defendant alongside either a Hispanic name (stereotype condition) or a name not associated with any ethnic group (control condition; Bodenhausen, 1988). Similarly, Pozzulo, Dempsey, Maeder, and Allen (2010) found that gender stereotypes also play a part in the courtroom, as male defendants were perceived as being guiltier than their female counterparts. This suggests that the representativeness heuristic may cause jurors to base their decisions on stereotypes, which may then cause racial and gender biases.

One reason for the representativeness heuristic being used by jurors (and general decision makers) may relate to cognitive load (Tversky & Kahneman, 1974, 1981), as it is much easier (in terms of cognition) for individuals to base their judgments on stereotypes in comparison to base line statistics (Gigerenzer, 2002). However, the representativeness heuristic's ignorance of base line statistics can lead to many different types of cognitive biases and fallacies (decisions based on flawed logic according to normative models), such as the base rate and inverse fallacies (Rachlinski, 2000).

In the base rate fallacy, the prior probability is ignored, which deviates from normative rules of decision making (Rachlinski, 2000). For example, in court, jurors may hear that the tyre marks left behind at a victim's home matched the tyres from a defendant's car, which may seem like damning evidence. However, the tyre marks found may match 90% of car tyres in that area. Therefore, base rate fallacy can be dangerous and is a consequence of the representativeness heuristic (Rachlinski, 2000).

The inverse fallacy is when decision makers "treat the probability of a hypothesis given the evidence… as the same as, or close to, the probability of the evidence given the hypothesis" (Guthrie, Rachlinski, & Wistrich, 2002, p.48). For example, in the Bayesian

example in the previous section, it was suggested that DNA analysis sensitivity was 90%. This observation of 90% is based on testing matches when the forensic analysts knew that the target DNA matched the defendants, which is not the same as suggesting that based on a positive result that the forensic analysts are 90% sure that the DNA found is the defendant's. In the inverse fallacy, the two statements above are seen as the same and the prior probability is ignored, which deviates from Bayesian norms, as P(A/B) is not equivalent to P(B/A), and the prior probability is needed to find the posterior probability (Rachlinski, 2000). In summary, the representativeness heuristic may lead to cognitive fallacies and biases in the courtroom through jurors ignoring base rate information and using stereotypes.

The availability heuristic is another heuristic investigated by Tversky and Kahneman (1974). It works on the premise that individuals make decisions based on the ease by which information comes to mind, allowing decisions to be made quickly and with relative ease (Tversky & Kahneman, 1974, 1981). However, this heuristic can cause people to over-estimate the probability of an easily imagined event occurring (Tversky & Kahneman, 1974, 1981), which could bias people's judgments in a number of situations, including the courtroom.

The availability heuristic can also cause decision makers to make errors in relation to both predicting the likelihood of an event occurring and when calculating the frequency of a reference group (Tversky & Kahneman, 1973). These errors occur because of a bias regarding the availability of certain pieces of information in the mind (Tversky & Kahneman, 1973). For example, Tversky and Kahneman, (1973) found that when participants were given a list of male and female names, and then asked to calculate which group had the higher frequency, the participants' estimates were affected by the presentation of famous names, as celebrity names are more retrievable than less-famous names. This result is interesting as the gender with the most famous names always had

fewest names presented, thus highlighting that the availability heuristic leads to an availability bias.

Romer, Jamieson, and Aday (2003) found that in USA there is a correlation between watching news and the perceived risk of crime. The more news watched, the higher the perceived risk of crime is, despite a general trend of crime reducing in the USA (Romer et al., 2003). One reasoning for this finding is that the more individuals watch the news, the more available crime is in an individual's memory, thus biasing their perceived risk of crime. Romer et al.'s (2003) study highlighted that the use of the availability heuristic can cause considerable error in relation to real life predictions.

The availability heuristic also has real world implications within the courtroom. For instance, Bell and Loftus (1985) suggested that the more vivid an eyewitness's testimony is, then the more persuasive said testimony is to a juror, as vivid information is easier to recall. This heuristic, therefore, biases jurors into using available/vivid information when making a verdict, which is non-rational, as less vivid eyewitness testimony may be equally as accurate (Bell & Loftus, 1985). In summary, the availability heuristic allows decision making that is quick, biased and prone to error.

A final classic heuristic, originally proposed by Tversky and Kahneman (1974, 1981), is the anchoring and adjustment heuristic. This heuristic suggests that people's judgments are sensitive to anchors (Tversky & Kahneman, 1974, 1981). Anchors are normally the first pieces of information given to decision makers, and they have a disproportionate effect on the decision making process and outcome. Tversky and Kahnman (1974, 1981) demonstrated that participants were sensitive to previously presented numbers, which caused an anchoring effect that was then adjusted for when making the final decision. However, these adjustments were often 'under-adjusted' and remained close to the original value (Tversky & Kahneman, 1974, 1981).

Tversky and Kahneman (1974) first experimented with anchoring and adjustment by asking participants to estimate certain values. For example, participants were asked how many African countries were in the United Nations (UN). A spinning wheel, with numbers around it from zero to 100, generated anchors. The wheel was rigged so that one group saw the number 10 and the other group saw the number 65. This manipulation highlighted a significant anchoring effect on the final estimates, individuals who saw the number 10 gave final estimates of 25%, whereas decision makers who saw the larger value gave a larger estimate of 45% (Tversky & Kahneman, 1974).

Within a courtroom, the anchoring and adjustment heuristic has been found to have an effect on defence lawyer sentence recommendations. For instance, Englich, Mussweiler, & Strack (2005) found that defence lawyer sentence recommendations adjust from the anchor set by prosecution lawyer's initial sentence recommendations, thus showing that cognitive short cuts can have an effect on every agent involved in the courtroom. In addition, Chapman and Bornstein (1996) tested the effects of anchors on civil court jurors. In one experiment, Chapman and Bornstein provided jurors with a case that looked at a woman who was suing her health-maintenance organization, as she claimed that the birth control pill she was prescribed gave her ovarian cancer. In the case, the plaintiff requested monetary compensation, and participants saw one of four monetary requests ($100, $20,000, $5 million and $ 1 billion), and it was found that these monetary requests acted as anchors for the juror's compensation awards (Chapman & Bornstein, 1996).

In a second experiment, Chapman and Bornstein (1996) gave participants the same case as experiment one, but in all of the conditions the plaintiff requested the same amount ($300,000). However, half of the jurors were told by an expert witness that in previous research, 10% of experimental rats that were given said birth control pill ended up with cancer (weak anchor), and the other half of participants were told that 90% of said experimental rats that were given the birth control pill ended up with cancer (strong

anchor). Jurors that were shown the strong anchor were more likely to think that the defendant was liable, and they were more confident that the defendant caused the plaintiff's injury (Chapman & Bornstein, 1996). In addition, jurors provided with the strong anchor viewed the defendant in a more negative manner (Chapman & Bornstein, 1996). Finally, jurors who were given the strong anchor gave higher compensation awards, which can be viewed as irrational, as evidence should impact on liability judgments but should not have an impact on the amount of compensation awarded (Chapman & Bornstein, 1996). This study highlighted that anchors influenced juror perceptions of the defendant, liability assumptions and compensation awards.

The anchoring and adjustment heuristic has many related biases, one such bias is the anchoring effect, which leads to insufficient adjustment (Tversky & Kahneman, 1974). Another bias relates to the overconfidence effect that is observed when participants are estimating subjective probabilities (Tversky & Kahneman, 1974). For instance, in one experiment, Tversky and Kahneman (1974) asked participants to articulate their beliefs, in the form of a probability distribution, surrounding the value of the Dow-Jones on a specific day. Further, they requested participants to select upper and lower fractiles (a number in a probability distribution for which some fraction of the distribution is lower than), which allowed a probability distribution to be calculated. A confidence range, from the lowest to highest estimation, could be calculated through such a method of assessment. Tversky and Kahneman (1974) found that the true value for the Dow-Jones only fell in-between the participants' mean 80%-confidence range (from .10 to .90 fractiles) in 52% of cases, thus the decision makers ranges were found to be overconfident (Block & Harper, 1991; Tversky & Kahneman, 1974).

Tversky and Kahneman (1974) proposed that the anchoring and adjustment heuristic created these overconfident ranges. They suggested that decision makers either generate or are given an initial anchor, which then leads to inefficient adjustment in relation to

both the upper and lower fractiles, thus causing this overconfident range. Tversky and Kahneman's (1974) results highlighted that decision makers have more confidence in their abilities than was justified, and that the anchoring and adjustment heuristic created this overconfidence effect/bias.

The current thesis has discussed three classic heuristics (and their associated biases), showing that error (miscarriages of justice) may occur in important decision making opportunities (homicide trials; Findley & Scott, 2006), through decision makers deviating from normative models of decision making. Nevertheless, there are a plethora of heuristics and biases that have been studied since Tversky and Kahneman's initial investigations which have not be discussed here; for more information on these heuristics see Fiedler & von Sydow (2015). However, to cover all of the researched cognitive short cuts and biases would be outside the scope of the current PhD.

It is important to note that heuristics and biases are not the same thing. Heuristics are cognitive short cuts that allow fast and frugal decision making to occur (Gigerenzer & Goldstein, 1996), whereas biases can be caused by heuristic models deviating from more normative/rational decision making models (Tversky & Kahneman, 1974, 1981), thus skewing the decision making process. Additionally, not all heuristics produce negative biases (Gigerenzer & Goldstein, 1996), and the heuristics and biases proposed by Tversky and Kahneman (1974, 1981) may hint at the possibility that cognitive mechanisms that relate to decision making can be quick, efficient, and based on very little information (Tversky & Kahneman, 1974, 1981).

Tversky and Kahneman (1974, 1981) may have missed part of the equation though, as they were more interested in internal processes of decision makers. Other researchers, however, such as Simon (1956), were more interested in investigating the interplay of internal cognition with the information supplied by the external environment. Therefore,

the heuristics and biases observed by Tversky and Kahneman (1974) may be a product of decisions being made in artificial rather than naturalistic environments (Todd & Gigerenzer, 2003). Environments with naturally occurring structures may have allowed individuals to use information (cues) in a way that may have stopped biases from occurring (Gigerenzer & Goldstein, 1996). For instance, research has found that biases, such as the overconfidence bias and the hard–easy effect, disappear when more ecologically valid structures/methodologies are used (Gigerenzer, Hoffrage, & Kleinbölting, 1991; Todd & Gigerenzer, 2003). On a similar note, juror experiments are artificial and normally present unrealistically small vignettes, this lack of detailed information may cause mock jurors to use heuristics and biases, as they have nothing else to base their verdicts on; thus, creating a myth surrounding jurors being biased (Weiten & Diamond, 1979).

In addition, many of Tversky and Kahneman's (1974, 1981) heuristics are beneficial on more occasions than they are incorrect. The availability heuristic is a good example of this. When Tversky and Kahneman (1974, 1981) investigated the availability heuristic, they asked decision makers to express whether particular letters were more likely to be found at the start of a word or in the midpoint of a word (i.e., three letters in). It was found that participants stated that it was more likely for the letters that they had seen to be placed at the beginning of a word. Therefore, Tversky and Kahneman proposed that they had shown that individuals had used the availability heuristic when making their judgments. The reasoning for this was because Tversky and Kahneman (1974, 1981) thought it would be easier for letters at the beginning of a word, in comparison to letters that are three letters into a word, to be brought mind. Tversky and Kahneman (1974) suggested that in their experiments with letter strings that the availability heuristic led to errors.

However, it has since been shown that the availability heuristic works more times than it does not, in the English alphabet, in regard to estimating whether letters are more likely

to be found at the start of a word or three letters into a word (Klein, 2001). This, therefore, proposes that heuristics may direct decision makers to accurate inferences, and that prejudices may be an integral part of the decision making process (Gigerenzer & Goldstein, 1996; Snook & Cullen, 2008). A more ecologically valid approach, which focuses on the potential value of heuristics and biased decision making, is consequently needed when examining decision making processes.

2.7.   Bounded Rationality

Simon (1956) took a more ecological view compared to other researchers, when trying to establish how individuals make decisions. Unlike Tversky and Kahneman (1974), Simon (1956) believed that in order to establish how decisions are made, psychologists needed to look beyond internal cognitive structures. In other words, it is not enough to simply satisfice (be content) with the internal mechanisms of decision making when carrying out research. Simon believed that the environment had the power to shape how decisions are made. Further, Simon thought that both the internal and the external needed to be researched together when attempting to decipher how individuals make decisions. Simon (1956) called his ecological theory of decision making bounded rationality.

Simon, like Tversky and Kahneman, believed that our cognition is limited, and that real life decision making processes do not mirror rational decision making models. Simon, however, suggested that the reason that our cognition is constrained is because we do not need a larger cognitive capacity, as our cognition is adequate enough for its purpose of using important and limited cues to make decisions (Todd & Gigerenzer, 2003). For example, the environment provides cues (information) that are used by individuals with limited cognitive processes to make accurate decisions in relation to ecological problems, such as food and predation (Simon, 1956; Todd & Gigerenzer, 2003).

It could be argued that human cognition is limited in its processing capacity because if Homo sapiens had evolved a larger and more powerful processing capacity, it would have been wasted with regard to its purpose. We only needed to evolve enough processing capacity to use the important and limited information (e.g., memory, seasons, and tracking cues) that is provided by the environment to distinguish between outcomes (e.g., go to one watering hole to hunt or go to the forest to gather berries; Todd & Gigerenzer, 2003). In addition, rational decision making, such as Bayesian analyses, may not have always led to positive outcomes for our ancestors. Heuristics are arguably more likely to lead to a false positive, whereas Bayesian analysis is more likely to lead to a false negative. For example, if a person sees movement in a bush, a heuristic may cause the individual to run away when no real danger is present, whereas Bayesian analysis may cause the person to stay incorrectly, as the posterior probability of anything dangerous being in the bush will be low. Therefore, heuristics may be inaccurate sometimes, but they increase survival. Conversely, Bayesian analysis may lead to accurate judgments most of the time, however when Bayesian analysis leads to false negatives, these outcomes may be disastrous.

The idea of bounded rationality is encapsulated by the following quote: "Human rational behavior [sic] is shaped by a scissors whose two blades are the structure of task environments and the computational capabilities of the actor." (Simon, 1990, p.7). This quote highlights that decision scientists cannot just study the internal, and that the external must also be considered. In regard to juror decision making, the external decision environment would encompass the number of decision making alternatives that are available to jurors (e.g., two-verdict system vs. three-verdict system), and the types of evidence presented to jurors.

The theory of bounded rationality raises a question about how much information individuals need to obtain from the environment to make decisions. Rational theories

would propose that individuals would use all the information available (Simon, 1956). Simon (1956) proposed a more novel approach, suggesting that individuals use information to reach a *satisficing level* (i.e., threshold) from which a decision can be made, instead of using information to *optimise* their decision outcome (Munier, Selten, Bouyssou, Bourgine, Day, Harvey, & Wensley, 1999). The term satisficing means that once the quantity and/or quality of the information provided from the environment is perceived by the individual as being suitable, then a decision can be made (Newell et al., 2003).

The fact that individuals can be frugal in how much information they use to make decisions means that individuals may be quick when making choices (Newell et al., 2003; Todd, 2001, cited in Todd & Gigerenzer, 2003). Additionally, such frugal decision strategies would not have been passed on to future generations unless it benefitted the species someway (i.e., leading to accurate decisions; Gigrenzer & Goldstein, 1996). Simon's (1956) theory of bounded rationality can be generalised to most environments, even courtrooms. For example, in terms of bounded rationality it could be suggested that jurors decide whether a defendant is Guilty or Not Guilty based on which verdict reaches a satisficing level first (Gigerenzer & Goldstein, 1996, 1999; Lee & Cummins, 2004; Ratcliff & Smith, 2004). In summary, individuals may use cues to reach a satisficing threshold, which may allow them to make decisions efficiently.

2.8. Fast and Frugal Heuristics

The most prominent researchers in the field of ecological rationality (the study of how cognitive and environmental structures interact when making a decision) are Gigerenzer and Goldstein (1996). Gigerenzer and colleagues were inspired by Simon's (1956) work, and proposed that fast and frugal heuristics may be useful for individuals in allowing them

to differentiate between opposing alternatives (Gigerenzer & Goldstein, 1996). Gigerenzer and Goldstein (1996) proposed that heuristics are non-compensatory (a combination of less valid cues cannot overturn a decision that was based on a very valid cue; Montgomery, 1983) and adaptive, and that a diverse set of heuristics may be available to decision makers. Their work suggests that individuals adapt their decision making strategies to environments based on the fact that certain rule of thumb techniques may be better suited. Fast and frugal researchers have also implied that it is better to have many biased heuristics in comparison to one decision making model with a large parameter (Gigerenzer & Brighton, 2009). Biased decision making models allow for better predictions to be made than decision making models with large parameters, which fit decision making data relatively well (Gigerenzer & Brighton, 2009).

Gigerenzer and Goldstein's (1996) fast and frugal heuristics fall under the Probabilistic Mental Model (PMM) theory. A PMM occurs if a decision maker cannot use knowledge from memory or deductive reasoning (i.e., local mental models: LMM) in order to make a decision (Gigerenzer, 2002; Gigerenzer et al., 1991). The knowledge utilised in an LMM is specific to the current decision, and no probabilities, inferences or reference classes are used (Gigerenzer et al., 1991). However, a PMM is deemed more successful in natural environments as it uses inferences by placing current decisions within a bigger context (Gigerenzer et al., 1991). PMMs connect the current task with a probability composition of associated environments (Gigerenzer et al., 1991). For example, PMMs allow decision makers to make predictions/decisions regarding the number of inhabitants a city has by using cues, such as whether the city has a football team, and associated cue validities (that relate to probability of the cue leading to a correct outcome; Gigerenzer & Goldstein, 1999) that are stored in long term memory.

These quick inferences, which are based on relatively few pieces of information, can lead to accurate decisions (Gigerenzer & Goldstein, 1996), which contradicts rational theories

of decision making, as there is no accuracy versus speed trade off (Brown & Heathcote, 2008; Gigerenzer & Goldstein, 1999; Lee, Newell, & Vandekerckhove, 2014). In addition, fast and frugal heuristics oppose the Story Model, as fast and frugal heuristics suggest that not all the information is used, whereas the Story Model proposes that jurors make a decision once they have heard all the information presented in court (Carlson & Russo, 2001).

Gigerenzer and Goldstein (1996) suggest that there are a number of heuristics that can be used to guide the decision making processes of individuals. They propose that an adaptive toolbox exists with several heuristics. Therefore, there is a heuristic (or tool) for every decision making environment. One heuristic that has been investigated widely by Gigerenzer and Goldstein (1996) is the Take the Best heuristic (TTB). This heuristic is well known, and has been researched extensively in many different decision making domains, from sport to economics (Andersson, Ekman, & Edman, 2003; Bergert & Nosofsky, 2007; Bröder & Gaissmaier, 2007; Bröder & Schiffer, 2003b; Brown & Tan, 2011; Gigerenzer & Goldstein, 1996; Todd & Gigerenzer, 2007). The TTB approach suggests that four main principles are used when making a decision: the recognition principle, information search, the stopping rule and the decision rule.

Most fast and frugal heuristics, including TTB, start with the recognition principle (Gigerenzer & Goldstein, 1996). This initial principle can shape the decision making process of the individual (Gigerenzer & Goldstein, 1996). If none of the alternatives are recognised, then the decision maker is forced to guess. However, if only one of the binary options is available/recognisable then the recognised outcome will be chosen (i.e., the recognition heuristic; Dhami & Ayton, 2001; Gigerenzer & Goldstein, 1996). More information is needed if both alternatives are recognised, which then promotes the use of the TTB heuristic (Gigerenzer & Goldstein, 1996).

In the TTB model, decision makers search in their memories across a subjective validity gradient (from most valid to least valid cue) in order to retrieve a satisficing cue value (Gigerenzer & Goldstein, 1996). Cue values allow binary options to be differentiated, and a cue has a different cue value for each of the options. A cue can have a value of one when it has a positive match with an option, a value of zero if the relationship between the cue and option is unknown, and, if the decision maker knows that the current cue does not match with one off the options, then a corresponding cue value of minus one is given (Gigerenzer & Goldstein, 1996). Research has also shown that the TTB model can explain information search in the external world (as opposed to search within the decision maker's memory) when the information is taxing (either cognitively or financially), such as biological evidence presented in court would be (Bröder, 2000; McAuliff & Kovera, 2008; Todd & Gigerenzer, 2012).

The point at which information search halts is called the stopping rule (Gigerenzer & Goldstein, 1996). The stopping rule encompasses two steps: 1) choosing if the current cue discriminates between the two outcomes; and, 2) stopping the search of cue values if the current cue discriminates between the two options. If the current cue does not discriminate between the binary options, then information search continues down the validity gradient. Finally, the decision rule is employed by choosing the outcome with a positive cue value, or by guessing if no cue can discriminate between the outcomes (Gigerenzer & Goldstein, 1996).

Gigerenzer and Goldstein (1996) describe this heuristic as "take the best, ignore the rest" (p.653). This ignorance of the rest has been shown to relate to highly accurate decisions being made (Gigerenzer & Goldstein, 1996). For instance, Gigerenzer and Goldstein's research found that participants were better at making decisions when they had less knowledge of an area (e.g., city size) and when they were frugal in their use of cues. In addition, Gigerenzer and Goldstein's (1996) research has highlighted that the TTB

algorithm was as good as multiple regressions when making correct inferences in relation to city sizes. Furthermore, fast and frugal heuristics are as accurate and may be a more natural way of making decisions than the more classical normative models (e.g., Bayesian model).

Fast and frugal heuristics have been studied within a courtroom environment. A groundbreaking study by Dhami and Ayton (2001) investigated the decision making processes of judges in civil (non-jury) cases. These judges sought to identify whether or not the defendant should be sentenced or released. The researchers were interested in the volume of information (number of decision cues) needed by judges to reach a decision about the case. The findings were surprising from a lay perspective: judges reached decisions using as little as one piece of evidence (or 'cue'), with the mean number of cues needed to reach a decision being 1.1. The findings indicated that rather than rationally weighting and evaluating all of the available cues, judges used a heuristic decision-making process, which allowed speed and small amounts of cues to be used to reach a decision, that is, the judges were using fast and frugal decision-making processes – specifically, in this study, the matching heuristic (Dhami & Ayton, 2001). This heuristic matches information from a specific case with a stereotypical version based on the decision maker's own experience (Dhami & Ayton, 2001). This therefore allows the decision maker to make efficient inferences from a frugal amount of relevant cues and his/her own experience. The matching heuristic may also be promoted in a courtroom because of time pressures (Dhami & Ayton, 2001).

This research is meaningful to the juror decision making context, as both the context around the decisions being made and the types of decisions are similar. Judges form judgments and make decisions under uncertainty (Dhami & Ayton, 2001), so too do jurors. Both jurors and judges are under time pressure, and the information that both of them have may be incomplete or piecemeal, reducing the opportunity for rational

weighting of all variables. In summary, Dhami and Ayton's (2001) research highlights that legal decision makers may not use all the information available (as would be expected according to the Story Model and Bayesian modelling), and rather frugal cue use might be promoted by heuristic processes.

There are, however, some differences between jurors and judges. For instance, judges have more experience and knowledge in relation to court cases than jurors have. This lack of experience in jurors may actually promote fast and frugal decision making, as Gigerenzer and Goldstein (1996) suggest that decision makers use fast and frugal heuristics when they cannot base their decision exclusively from knowledge stored in the mind. Furthermore, a juror's lack of knowledge/experience may promote fast and frugal heuristics.

Although the TTB approach has been found to be fast, frugal and accurate (Gigerenzer & Goldstein, 1996), some researchers have highlighted that fast and frugal heuristics may not be widely used in decision making tasks (Hilbig, 2010; Newell et al., 2003; Newell, Rakow, Weston, & Shanks, 2004). For instance, Newell et al. (2003) conducted a study where participants could buy up to six pieces of information and then use this information to choose which shares would benefit them most financially. In the study, more information was bought than was needed. Further, it was found that only 33.33% of participants used rules entirely consistent with the TTB approach. This suggests that the adaptive toolbox may not be the most realistic metaphor to use when it comes to decision making in real life situations (Gigerenzer & Goldstein, 1996; Newell et al., 2003).

In addition to heuristics, such as TTB, not being widely used, other criticisms also exist. One such criticism is that some decision making researchers have suggested that rational decision making may not be associated with high cognitive costs, and that, instead, heuristics may be associated with increased cognitive effort (Bröder & Schiffer, 2003a),

as choosing which adaptive strategy to use in a particular environment may be cognitively taxing (Bröder & Newell, 2008). Additionally, accumulating and storing knowledge in memory, in relation to the rank order of cues, may put strain on the cognitions of decision makers; also, cue validity frequency counters do not seem realistic (Dougherty, Franco-Watkins, & Thomas, 2008). This, therefore, shows that the simple advantages that fast and frugal heuristics may have in regard to reducing cognitive constraints may be good in theory, but may be lost in practical application. Consequently, a more realistic model of decision making may be needed, which is less specialised to different environments, yet which can adapt to environments through the use of adaptive processes/parameters (Lee & Cummins, 2004).

It must also be mentioned that the TTB model may not be an ecologically valid approach when looking at juror decision making, as jurors are not presented with information across a validity gradient, and jurors do not have the opportunity to learn about cue validities and cue values. In addition, jurors cannot stop information being presented to them once a stopping rule has been applied. In summary, contemporary research seems to highlight that fast and frugal heuristics may not be as realistic as they once seemed, which may then highlight that a different approach, such as a unified (threshold) model, may be a more realistic way of explaining juror decision making.

2.9. Unified Threshold Model

The remainder of the current chapter will discuss how a unified threshold model of decision making can explain both rational and intuitive decision processes. A unified threshold model aims to encompass all of the heuristics within the fast and frugal research paradigm. That is, instead of a number of heuristics being used to make decisions in different environments, one decision making strategy that fits all environments, through

varying cue utilisation, is argued to exist (Lee & Cummins, 2004). In the threshold model, it is argued that decisions are made when a specific threshold is met (Ratcliff & Smith, 2004) and that said threshold might shift to suit different environments (Lee & Cummins, 2004). If intuitive decision making is needed, the threshold is low, meaning fewer cues are used, whereas if rational decision making is needed, cue utilisation will increase as the threshold increases.

One of the main reasons for the emergence of a threshold model of decision making is because participants have been shown to use both non-compensatory and compensatory processes when making decisions in experiments (Lee & Cummins, 2004); hence, existing models are not able to describe decision processes fully. Previous research has shown that different decision making strategies, including the TTB approach, are used in some scenarios and not others (Bröder & Schiffer, 2003b; Brown & Tan, 2011; Hoffmann, von Helversen, & Rieskamp, 2013; Sojka & Giese, 2001). For instance, verbal information and memory-based tasks are likely to cause participants to use strategies associated with the TTB approach, and rational processes of decision making are more associated with visual, image based tasks and tasks that do not rely on memory (Bröder & Schiffer, 2003b; Bröder & Gaissmaier, 2007; Newell et al., 2003). Therefore, a unified threshold model may give a more comprehensive account of decision making across different scenarios in comparison to the adaptive toolbox metaphor (Newell & Lee, 2010).

Threshold models may give a more global explanation of decision making than fast and frugal heuristics can, as threshold models can explain everything from the TTB model to rational decision making, without adding additional conceptions of complicated strategies (Connolly, 2000; Lee & Cummins, 2004; Lee et al., 2014). They can also explain Tversky and Kahneman's (1974) heuristics through having a satisficing threshold. Furthermore, the threshold model encompasses more data, thus making said model more complete in

regard to the scientific goal of generating global theories (Lower, 2008), which are of commonplace in the natural sciences.

The unified model of decision making has also been described as an "adjustable spanner" (Newell, 2005, p.7). Essentially, rather than changing strategies to suit different environments, decision makers simply tailor their thresholds, and make decisions once a threshold has been reached (Newell, Collins, & Lee, 2007; Newell & Lee, 2010). That is, decision makers adjust their tolerance for how much evidence is acceptable to make a decision, and these tolerance levels/thresholds can change depending on the situation (Lee & Cummins, 2004; Newell & Lee, 2010; Söllner, Bröder, Glöckner, & Betsch, 2014). Consequently, in some environments (e.g., jury settings) people may use all of the information supplied, whereas in less important decisions (e.g., what to have for dinner) individuals may only have a low threshold, allowing the decision to be made using less cues (Newell & Bröder, 2008; Söllner et al., 2014).

The Evidence Accumulation Model (i.e., a type of threshold model; Lee & Cummins, 2004) uses elements of the TTB algorithm and the rational decision making approach (Bergert & Nosofsky, 2007); these elements essentially relate to threshold level (Newell & Bröder, 2008). For instance, if the threshold for a certain decision is small, then individuals may be frugal in their use of cues (Lee et al., 2014; Newell & Bröder, 2008). However, if individuals are using many cues, or all of the cues to make a decision, then it might be because their threshold for this particular decision is relatively high (Lee et al., 2014; Newell & Bröder, 2008); this relates nicely to juror decision making. For instance, if a juror has limited motivation or has a pre-trial bias, then they may be less motivated to use rational processing (Cacioppo, Petty, Feinstein, & Jarvis, 1996; Estrada-Reynolds, Gray, & Nuñez, 2015), thus their threshold will be low and a small amount of information will be utilised, whereas more motivated jurors may be more likely to use

most or all of the information available (Cacioppo et al., 1996) and will consequently have a higher threshold. Furthermore, the threshold model is flexible enough to encompass individual differences in cue utilisation, motivation and pre-trial biases in jurors.

Lee and Cummins (2004) tested the Evidence Accumulation Model by comparing the usage of two different models of decision making with this model. One of the models that was used was the rational model (i.e., RAT; Lee & Cummins, 2004). In this model, individuals use all the information and will chose the outcome with the most support. The other model used in this research was the TTB approach, which was discussed earlier. The only difference between the two models related to accumulation of evidence (Brunton, 2013; Bergert & Nosofsky, 2007; Lee & Cummins, 2004; Newell & Lee, 2009). When the TTB approach was used, individuals accumulated less evidence, and thus had a lower threshold (Bergert & Nosofsky, 2007; Lee & Cummins, 2004).In contrast, when the RAT strategy was chosen, individuals accumulated more, or all, of the information/cues, which means that they had a higher threshold (Bergert & Nosofsky, 2007; Lee & Cummins, 2004).

Lee and Cummins' (2004) comparison of the RAT and TTB models found that both strategies were used, but not exclusively across 52.5% of participants in the sample. The unified model, however, accounted for 84.5% (compared to rational encompassing = 64% and TTB fitting = 36% of the decisions made) of the decision making strategies utilised by the participants (Lee & Cummins, 2004). A unified model, therefore, accounted for more of the decision making behaviour across the participants than any single model could do alone, thus highlighting that a unified threshold approach may be the most appropriate metaphor to use in relation to decision making (Lee & Cummins, 2004). Further, the fact that intra-participant differences (Newell & Lee, 2009) and inter-participant (Lee & Cummins, 2004) differences in strategy use has been discovered

highlights that people do not adapt their strategies to the task at hand, and that the adaptive toolbox is a theoretical illusion.

A more suitable metaphor for decision making may be an adjustable spanner (discussed earlier), where decision makers adapt their stopping rule (which can also be referred to as a threshold) to the task, as this allows both RAT (high threshold) and TTB (low threshold) strategies to be incorporated into a single model (Lee & Cummins, 2004; Newell & Lee, 2009). Further, threshold models normally encompass a starting point and threshold point (Ratcliff & Smith, 2004), which links in well with legal instructions to jurors relating to both the presumption of innocence (innocent starting point) at the beginning of a trial and being beyond reasonable doubt (i.e., Guilty threshold; Saks & Risinger, 2003) before giving a Guilty verdict. In summary, the threshold model of decision making is a more global model in comparison to previous decision making models, and may apply well to the legal environment.

Despite its apparent strength over other models, however, the unified approach to decision making has inherited the same issues experienced within the fast and frugal research paradigm. The fast and frugal problem of solving how and when specific heuristics are selected from the adaptive toolbox can be replaced by the problem of deciphering how thresholds are chosen (Newell et al., 2007). While this is an issue, it is outwith the scope and aims of the current thesis to investigate, as the current thesis aims to investigate how jurors reach verdicts rather than how thresholds are set. The next section will give a brief summary of the current chapter and will outline the aims of the thesis.

2.10. Chapter Summary

This chapter began by outlining that a juror is a legal layperson that decides on whether or not a charge has been proven based on the information provided in court (SCTS, 2015).

The Scottish legal system and its additional Not Proven verdict was then discussed, this section highlighted that Not Proven verdicts are given in difficult cases, that they reduce the amount of Not Guilty verdicts given, and that they are unique to the Scottish legal system (Hope et al., 2008; Smithson et al. 2007). Previous juror decision making models, such as the Story Model, were then presented. This section highlighted that the Story Model lacked utility, as predictions cannot be made using this model, and naively assumes that decision makers use all the information available, this assumption has been challenged both by decision scientists (Gigerenzer & Goldstein, 1996) and juror decision making researchers (Carlson & Russo, 2001). This section also highlighted that there is a lack of research investigating juror decision making within a Scottish three-verdict context, the current thesis aims to rectify this. In addition, this study highlighted that some juror decision making research neglects the process behind how jurors reach verdicts; therefore, traditional decision science research was consulted to counteract this.

The research review then focused upon traditional and modern decision science models in an attempt to find a possible model that may apply to a juror setting. This investigation led to three main decision science approaches being evaluated: 1) rational decision making; 2) heuristics and biases; and, 3) bounded rationality (i.e., fast and frugal heuristics). It was found that rational models were not realistic and that the heuristics and biases programme was too negative and did not take into account the influences of the environment (Gigerenzer & Goldstein, 1996). Fast and frugal heuristics were also limited in regard to both the consistency of their usage and their poor ecological validity (Dougherty et al., 2008; Lee & Cummins, 2004). The unified threshold approach to decision making was then evaluated and said model was found to be a more comprehensive account of decision making in comparison to the other approaches mentioned above (Lee & Cummins, 2004).

2.10.1. Current research.

The current chapter has identified three main research aims for this thesis. First, can a unified threshold model of decision making explain the process through which jurors reach their decisions? This aim was identified as the current chapter highlighted that neither rational models of decision making nor intuitive (i.e., heuristic) models of decision making can adequately explain decision processes on their own. Further, Lee and Cummins (2004) showed that a unified threshold model of decision making, which encompassed both the RAT and TTB model, could explain more decision making data than any single model could. It is believed that a unified threshold model of decision making may also explain juror decision making processes, as previous research has highlighted that both rational and heuristic processes have been observed in a juror context (Chapman and Bornstein, 1996; MacCoun, 1989). Therefore, the various findings from different researchers may have occurred due to unique thresholds being set by participants (in relation to cue utilisation) rather than separate processes being used. The aim above will be researched in Chapter Three.

Second, can the threshold model of decision making explain rational decision making processes (i.e., information integration) and commonly observed biases? This aim arose out of the need to test whether or not a unified threshold model is truly a global model of decision making that can encompass commonly observed decision making phenomenon, such as information integration; this aim will be tested in Chapter Four. In addition, the current chapter highlighted that both rational decision making (i.e., information integration) and cognitive biases have been observed in previous juror decision making research (Esqueda et al., 2008; Kaplan & Miller, 1978). Therefore, the current thesis aims to investigate if cognitive biases and information integration can be explained by a unified threshold model of decision making.

Third, does the decision environment (i.e., number of verdicts available) and internal cognitive mechanisms (i.e., anchoring and adjustment) of the decision maker have an effect on the decision making of jurors? Simon (1956) suggested that the environment needed to be taken into account when studying decision making, and Tversky and Kahneman (1974) proposed that internal cognitive heuristics might bias decision makers. Consequently, Chapter Five will take a bounded rationality approach to juror decision making, and will investigate both the internal cognitive short cuts of jurors and the influence that different decision making environments have on jurors.

Finally, once all these aims have been tested, a general discussion will be presented that will outline each of the chapters, the limitations of the research conducted in the current thesis, the implications (both theoretical and practical) of this thesis, and possible future directions for this area of study.

3. Chapter Three: Threshold Decision Making within Jurors

In the previous chapter, the core theories of decision science were discussed, alongside their application and suitability in explaining juror decision making. While there is a wealth of evidence in support of both the classic heuristic and biases programme (Tversky & Kahneman, 1974) and for the fast and frugal paradigm (Gigerenzer and Goldstein, 1996), it was determined in the last chapter that neither of these approaches alone are sufficient in explaining the complex decision making processes. In addition, the literature review highlighted that classical rational models of decision making may not fully explain decision processes either (Lee & Cummins, 2004). Instead, it was argued that a unified threshold model of decision making allowed for more decision making data to be described (Lee & Cummins, 2004). Therefore, the current chapter will empirically investigate if unified threshold models of decision making can explain juror decision processes.

The current Chapter will first expand on the previous literature review surrounding unified threshold approaches to decision making. It will discuss and compare two specific types of threshold models: the Diffusion Threshold Model and the Counter Threshold Model (Ratcliff & Smith, 2004). The main aim of this chapter is to identify which of the two threshold models best explains a juror's decision making processes. This aim will be studied through a quasi-experimental investigation, and the methodology and results of said investigation will be presented in the proceeding sections of Chapter Three.

3.1. Which Threshold Model is most appropriate within the context of Juror Decision Making?

There are two categories of threshold model that can be used as a metaphor to describe decision processes: Counter Threshold Models (absolute stopping rules) and Diffusion Threshold Models (relative stopping rules; Gold & Shadlen, 2007; Ratcliff & Smith, 2004). Both of these categories propose that evidence is searched by (or given to) a decision maker and once a threshold is reached, either on the same continuum or different counters, a decision is made (Gold & Shadlen, 2007; Ratcliff & Smith, 2004). These models have large parameters (i.e., allow more of the decision making data to be explained; Gigerenzer & Brighton, 2009; Ratcliff & Smith, 2004) and are less specialised, or biased, than Fast and Frugal models. This allows these thresholds models to explain both rational and intuitive decision making processes (Lee & Cummins, 2004).

All of the models which will be discussed in this chapter are traditionally based within the perceptual decision making discipline. The current thesis, therefore, aims to apply these modes within a more psychological context by incorporating biases and individual differences into the discussion and investigation of said threshold models. Each of the two categories of threshold decision making will also be discussed and studied within the context of the Scottish legal system.

3.1.1. Counter Threshold Models.

Counter Threshold Models of decision making propose that when individuals, such as jurors, are making decisions, they collect evidence on separate counters (alternatives) with separate thresholds (Gold & Shadlen, 2007; Potter, 2011; Smith & Ratcliff, 2004). For example, for jurors, the two counters could relate to verdict decisions (Walters, 2007); one counter could be for a Guilty verdict and another counter could be for a Not Guilty

verdict (Smith & Ratcliff, 2004). In these counters, the same mechanism as described by Lee and Cummins (2004) occurs; that is, the threshold that is reached first leads to an absolute stopping rule, and causes a decision to be made (Ratcliff & Smith, 2004; Rouder, 2001). In some Counter Threshold Models, such as the Linear ballistic model, more than two counters can be used in the decision process (Brown & Heathcote, 2008), which suggests that Scottish jurors could also count Not Proven evidence until a threshold is reached.

This absolute stopping rule approach to decision making can be broken down further into two different types of Counter Threshold Model. First, there is the Accumulator Model where evidence intake varies but occurs at fixed intervals (Ratcliff & Smith, 2004). Second, there is the Poisson Counter Model (Lemieux, 2007) where evidence accumulation is fixed, but the accrual of information happens at variable times across a continuous time scale (Ratcliff & Smith, 2004). These two models are the most relevant within the current thesis as they are the main successors of early Counter Threshold Models, they are well cited within the literature and they vary enough to give a full view of what encompasses a Counter Threshold Model of decision making (Ratcliff & Smith, 2004).

In the Accumulator Model, evidence is collected across two separate counters (Ratcliff & Smith, 2004; Smith & Ratcliff, 2004). Varying evidence amounts are collected in a sequential fashion, using a sensory referent mechanism, at discrete time periods (Ratcliff & Smith, 2004; Smith & Ratcliff, 2004; Van Maanen & Van Rijn, 2007). The sensory referent mechanism allows information to be both placed into the appropriate counters (one or two) and weighted. If information surpasses the sensory referent, which is equivalent to zero, the residual difference between the information collected and the sensory referent is placed into counter one (Ratcliff & Smith, 2004). However, if the information falls short of the sensory referent, the residual difference between the

information collected and the sensory referent is placed into counter two. In this example, it could be suggested that any information that is placed above the sensory referent may highlight guilt and can be placed into the Guilty Counter; whereas, information that may fall short of the sensory referent may highlight innocence and can be placed into the Not Guilty Counter. Further, the information is collected in separate counters until one threshold is reached (Ratcliff & Smith, 2004; Smith & Ratcliff, 2004); this then allows a decision to be made.

This model may fit well within a juror decision making context, as two counters could be used (Guilty versus Not Guilty) that collect evidence in a sequential fashion until a threshold is reached, thus allowing a decision to be made. There is evidence that supports the Accumulator Models existence (Ratcliff & Smith, 2004; Smith & Ratcliff, 2004); with Ratcliff and Smith (2004) suggesting that Accumulator Models fit decision making data better than other models, such as the Poisson Counter model. Ratcliff and Smith (2004) came to this conclusion after asking participants to take part in three experiments. The first was a signal detection experiment, where participants were asked to make a judgment on whether the distance between dots was small or large. In experiment two, participants were asked to make a decision on whether a letter string was a word or a non-word. For the first two experiments, participants were told to either value accuracy or speed, and this value varied between the blocks of trials. In the final experiment, participants were asked to state whether they recognised or did not recognise a target word in relation to a previously shown list of words. The Accumulator Model and Poisson Counter Model were then fitted against the data (i.e., response times for correct and incorrect responses, accuracy rates and distributions) from all three experiments. As previously stated, it was found that in decision tasks that the Accumulator Model outperformed the Poisson Counter Model in relation to describing the decision making data. Therefore, in a juror

decision context, the Accumulator Model may also describe juror decision processes more adequately than the Poisson Counter Model.

Models that are related to the Accumulator Model (e.g., the self-regulating accumulator) have also been used to map how confidence can change and adapt thresholds (Hausmann & Läge, 2008; Lee & Dry, 2006; Lee et al., 2014). This shows that thresholds are adapted by confidence (Lee & Dry, 2006), which may suggest that in a practical, legal setting that likelihood of guilt ratings may be a good measure to demonstrate thresholds (Connolly, 2000; MacCoun, 1989), as this rating system would reflect confidence for both Guilty and Not Guilty verdicts. However, one potential problem with Accumulator Models being applied to juror decision making is the fact that information is collected in a discrete fashion in said models, whereas lawyers may not present evidence at discrete time periods. In addition, Ratcliff and Smith (2004) found, in their three experiments described in the above paragraph, that Diffusion Threshold Models outperformed the Accumulator Model in relation to describing decision making data. Furthermore, the poor ecological validity and descriptive ability of the Accumulator Model suggests that it might not be a good metaphor in explaining juror decision making processes in practice, despite its theoretical fit.

A model that is similar to the Accumulator Model, and which may be more ecologically valid in relation to juror decision making, is the Poisson Counter Model (Lemieux, 2007). This model proposes that information is independently accrued in exact pieces (i.e., a cue or a value) at a constant rate (continuously distributed times), and is gathered on separate counters representing different outcomes (Merkle & Van Zandt, 2006). The evidence continues to accrue until a threshold is reached (Smith & Ratcliff, 2004), which then allows a decision to be made. Further, the quality of the information can increase the accumulation of one count over another (Ratcliff & Smith, 2004). This links to

naturalistic decision making, as the environment also has an effect on the decision making process (Gigerenzer & Goldstein, 1996; Simon, 1956).

One example of a Poisson Counter Model comes from Thomas and Hogue (1976); they previously proposed that the Poisson Counter Model of decision making might fit well within a juror context. They suggested that, in the model, evidence was collected based on how a juror interpreted the evidence in court; therefore, the information that is accrued is either for the defendant or against them. In a Poisson process, the evidence and non-evidentiary factors are counted, and a summary of all evidence is given in the form of a weight (Kerr, 1993; Thomas & Hogue, 1976). This evidence weight can be represented by the symbol $\tilde{A}$. This $\tilde{A}$ would be large if a large volume of evidence highlighting guilt was presented to the juror, and would be small if more evidence that proposed innocence was presented to the juror (Kerr, 1993; Thomas & Hogue, 1976). If $\tilde{A}$ (evidence weight) is larger than the threshold ($\check{T}$: thresholds are thought to be constant across jurors), then a Guilty decision will be made (Kerr, 1993; Thomas & Hogue, 1976). The same would be true if $\tilde{A}$ was lower than $\check{T}$, but in this case, a Not Guilty verdict would be reached.

This model of decision making also incorporates confidence in relation to outcomes. The greater the distance that $\tilde{A}$ is from $\check{T}$ when a decision can be made, then the greater the confidence the juror will have in their verdict (Kerr, 1993; Thomas & Hogue, 1976). The accrual of $\tilde{A}$ will stop, though, once a valuable piece of evidence is provided (i.e., a 'critical event'; Kerr, 1993; Thomas & Hogue, 1976). This suggests that once a confidence threshold is reached, then a decision can be made (Glöckner & Bröder, 2011; Hall, Ariss & Todorov, 2007; Lee & Dry, 2006; Peterson & Pitz, 1986; Potter, 2011; Tsai, Klayman, & Hastie, 2008). Thresholds in a legal setting may take the form of likelihood of guilt ratings, as this would represent confidence in both Guilty and Not Guilty verdicts. The Poisson Model of decision making fits confidence data relatively well, and can explain biases such as the over-confidence effect (Merkle & Van Zandt, 2006).

In addition, within the Poisson Counter Model non-evidentiary factors, such as characteristics of the individual, are also counted in a separate counter (Kerr, 1993; Thomas & Hogue, 1976). This counter works in the same way as the counter for evidentiary factors. In this model, the juror's opinion of guilt is based on the sum value of both evidentiary and non-evidentiary factors at their frozen points (i.e., when both their critical events from the information presented in the trial has occurred; Kerr, 1993). In addition, the Poisson Model could be adapted to have two or three counters, each representing a different outcome (Ratcliff & Smith, 2004).

The thresholds in the Poisson Model have been shown to be influenced by many external variables (Kerr, 1993). For example, deliberations have been shown to increase Poisson thresholds, which can create a leniency shift; thus, reducing the likelihood of a Guilty verdict occurring (Kerr, 1993). Therefore, the decision making processes of jurors intertwines with the environment when making decisions (Simon, 1956), and Thomas and Hogue's Poisson Counter Model may be able to explain juror processes within a jury.

In summary, the absolute stopping rule of traditional Poisson Counter Models is a straightforward approach to decision making and has been applied previously to a juror context (Thomas & Hogue, 1976). However, there are a number of limitations to the Poisson Counter Model. First, Ratcliff and Smith (2004) found that the Poisson Counter Model was poor at describing decision making data. Second, contrary to Thomas and Hogue's (1970) beliefs, individuals may have different decision thresholds (Lee & Cummins, 2004), and this needs to be taken into consideration when studying real juror decision making strategies. Third, Thomas and Hogue's (1976) Poisson Counter Model cannot explain why verdict reversals occur. A relative stopping rule, therefore, may be more appropriate in relation to juror decision making.

3.1.2. Diffusion Threshold Models.

Diffusion Threshold Models are a second type of unified threshold model, and they incorporate relative stopping rules (Ratcliff & Smith; 2004). A relative stopping rule outlines that once a decision maker has integrated enough information to favour one alternative relative to another, symbolised by a threshold, then an appropriate decision is made (Ludwig, 2011). In other words, if the integration of evidence causes a certain amount of information to favour a Guilty verdict relative to a not guilty verdict, by reaching the Guilty threshold, then a Guilty response will be given.

Diffusion Threshold Models are a more dynamic approach to decision making in comparison to Counter Threshold Models (Ratcliff & Smith, 2004). In Diffusion Threshold Models, the two thresholds are on the same continuum, and evidence that supports one outcome has a detrimental impact on the other outcome (Gold & Shadlen, 2007; Ratcliff & Smith, 2004), thus evidence that pulls a decision maker to one threshold, will push them away from the opposing threshold. Similar to the Counter Threshold Model, though, the reaching of a threshold leads to a decision being made (Zhang, Lee, Vandekerckhove, Maris, & Wagenmakers, 2014).

Diffusion Threshold Models appear to fit previous decision making data better than Counter Threshold Models (Ratcliff & Smith, 2004). The starting points in the Diffusion Threshold Model may vary across individuals depending on how early their decision making process has started. This fits well with the concept of 'biased jurors' and jurors who have been affected by pre-trial information (Laming, 1968, Ratcliff & Smith, 2004, Smith & Ratcliff, 2004). Likewise, research on this theoretical approach has suggested that the further away the threshold is from the starting point, the slower and more accurate the response will be (Ratcliff & Smith, 2004; Smith & Ratcliff, 2004); thus, jurors with higher thresholds and who use more information will be more accurate than jurors with

lower thresholds (Sangero & Halpert, 2007). These results directly contradict previous findings that support fast and frugal heuristics.

Diffusion Threshold Models of decision making have been supported by findings emerging from neuroscience research (Smith & Ratcliff, 2004), electroencephalogram (EEG) studies, and psychophysics studies (Bogacz, Brown, Moehlis, Holmes, & Cohen, 2006; Ratcliff, Philiastides, & Sajda, 2009; Ratcliff & Rouder, 1998; Yeung & Summerfield, 2012). Three key Diffusion Threshold Models will now be discussed.

The first is the Wiener Diffusion Model, which was named after the mathematician Norbert Wiener who discussed stochastic processes (a pattern that can be statistically analysed, but that is difficult to predict; Smith and Ratcliff, 2004). Smith and Ratcliff (2004) were the first researchers to describe the model within a psychological context. In this model, information is collected from a starting point ($Ş$), and is gathered until one of two thresholds are reached. In a juror context, these thresholds would correspond to Not Guilty ($Ň$) and Guilty ($Ģ$) verdicts (Ratcliff & Smith, 2004; Smith & Ratcliff, 2004). Once a threshold is reached, a decision is made (Smith & Ratcliff, 2004). The rate of the accumulation of information from the starting point, $Ş$, to either of the thresholds, $Ň$ or $Ģ$, is called the drift rate ($Θ$) (Ratcliff & Smith, 2004).

The drift rate is the mean information accrual from a stimulus over specific time units (Ratcliff & Smith, 2004). Drift rates are relatively flexible as they can change depending on the complexity of the decision making task (Ratcliff & Smith, 2004). For example, drift rates are larger for simple decisions and are smaller for cases that are more complex. This has implications for real world decisions, as decisions with small drift rates involving low evidence quality will have longer response times, and may be more likely to be incorrect (Ratcliff & Smith, 2004; Smith & Ratcliff, 2004). In terms of juror decision making, evidence tends to be of mixed quality, often ambiguous, and the decision is often

complex. Therefore, it could be argued that juror decision making may be poor due to the context in which they are made, and due to the way in which the information is processed. Drift rates can be positive or negative depending on whether the information that has been accumulated is causing individual drifts to move towards a negative threshold or a positive threshold (Link & Heath, 1975; Ratcliff & Smith, 2004). Nevertheless, it is not essential to explicitly measure drift rate as cue utilisation is a similar measure that is more commonly used and is more practical in relation to conducting decision making research (Gigerenzer & Goldstein, 1996; Vandekerckhove & Tuerlinckx, 2008).

An additional important theoretical contribution of the Wiener Diffusion Model is that the starting point of the model can change (Ratcliff & Smith, 2004). Individuals may not start off symmetrically, in-between the two thresholds, but may instead be biased towards a certain threshold (Ratcliff & Smith, 2004). This model may, consequently, explain decision biases (Ratcliff & Smith, 2004; Smith & Ratcliff, 2004) that were originally identified by Tversky and Kahneman (1974, 1981), as discussed in the previous chapter.

A skewed starting point has also been associated with quicker decisions that are less accurate (Ratcliff & Smith, 2004), once again mirroring the heuristics and biases programme. If a starting/prior point is close to a threshold, then less information is needed to reach said threshold, which increases the likelihood of an error and makes the decision more likely to be quick (Ratcliff & Smith, 2004), thus skewed starting points may facilitate fast and frugal decision making. The Wiener Diffusion Model can also explain commonly observed psychological phenomena, such as the speed/accuracy trade-off (Franks, Dornhaus, Fitzsimmons, & Stevens, 2003; Smith & Ratcliff, 2004). In addition, through allowing drift rate and starting points to vary, the model can explain why errors happen quickly in accuracy focused tasks and why errors happen more slowly in speed focussed tasks, when compared to correct responses (Link & Heath, 1975; Ratcliff & Rouder, 1998; Ratcliff & Smith, 2004). The difference in findings between the fast and

frugal paradigm and the heuristics and biases approach may, therefore, arise because of differences in task orientation (i.e., speed vs. accuracy).

Previous research has suggested that incorrect decisions occur when we deviate from the classical rational approach (Tversky & Kahneman, 1974, 1981). Nevertheless, the Wiener Diffusion Model proposes that errors and correct responses come from fluctuations and variability in starting points, drift rates, threshold levels and noise (Ratcliff & Rouder, 1998; Ratcliff & Smith, 2004; Smith & Ratcliff, 2004). There are two types of noise: external and internal noise (Heeger, 1997). External noise relates to the validity and reliability of the information that the juror is given, while internal noise is associated with the accuracy of cognitive and neuronal processes in detecting information that highlights guilt and innocence (Heeger, 1997). Noise is unlikely to influence the results of the current research.

However, research traditionally investigating Diffusion Threshold Models (i.e., perceptual decision making tasks) use visual and visuomotor tasks involving 'dots' on a screen within their experiments and ask participants if these 'dots' move to the right or the left (Bitzer, Park, Blankenburg, & Kiebel, 2014). This creates a lot of noise, which is unrealistically high, at levels that are likely not to occur in a legal decision making task (Bitzer et al., 2014). The real world applicability of the model is, therefore, unclear, despite its theoretical grounding appearing to be ideally suited to explain juror decision making.

In summary, the Wiener Diffusion Model incorporates mathematical principles from a normative approach, and has inbuilt biases attached within it. This allows juror decision making to be studied in a realistic way through combining both rational and biased approaches.

The Ornstein-Uhlenbeck model (as described by Ratcliff & Smith, 2004) is essentially an extension of the Wiener Diffusion Model of decision making. This model proposes that the more evidence collected, the more decay will happen; and decay is defined as a mathematical function that decreases the drift (Ratcliff & Smith, 2004). The decay function, however, has been found to have an influence on how well the model fits decision making data (Ratcliff & Smith, 2004). When the model has a moderate or large decay, it has been demonstrated not to fit decision making data as well as the original Wiener Diffusion Model (Ratcliff & Smith, 2004). The Ornstein-Uhlenbeck model fit Ratcliff and Smith's (2004) experimental data best when the decay parameter was zero, meaning that it mirrored the Wiener Diffusion Model. Therefore, the Wiener Diffusion Model may be a more applicable model for juror decision making due its more elegant fit with previous decision making data.

A final Diffusion Threshold Model that will be discussed is the Drift Diffusion Model (DDM), which is a type of Wiener Diffusion Model (Bogacz et al., 2006; Zhang, 2012). The DDM is normally incorporated within a binary alternative forced-choice task (Bogacz et al., 2006). Within these tasks, three assumptions are made: evidence that supports each binary choice is integrated continuously throughout a trial (Ratcliff & Rouder, 1998); decisions are made when relative evidence is provided that allows a threshold to be reached; and the decision making process can change randomly (Bogacz et al., 2006). In this model, drift represents evidence accumulation, and this drift is disturbed by noise (Bogacz et al., 2006).

 The DDM is a metaphor for decision making processes as it is relatively straightforward, well defined and is supported by both behavioural and neuroscientific data (Bogacz et al., 2006). This Diffusion Threshold Model has similar theoretical implications in decision tasks to the Wiener Diffusion Model (Bogacz et al., 2006). Further, in the DDM, the decision making strategy is not deterministic and the wrong threshold can therefore be

reached (Hare, Camerer, Knoepfle, O'Doherty, & Rangel, 2009, cited in Milosavljevic, Malmaud, Huth, Kochand, & Rangel, 2010).

A pure DDM model is relatively static (Bogacz et al., 2006), as the starting point is unbiased and fixed (Bogacz, et al., 2006). From this fixed starting point ($Ş$), information causes the drift rate (**E**) to increase or decrease depending on what alternative the information favours (Bogacz et al., 2006), this allows **E** to cross one of two fixed thresholds: Not Guilty (**Ň**) and Guilty (**Ģ**) (Bogacz et al., 2006). In addition, the decision making process can change throughout a task: **E** may initially move towards **Ň,** and then incorrect information (noise; Heeger, 1997) may cause **E** to move towards **Ģ** (Bogacz et al., 2006), thus highlighting that said model is flexible enough to explain verdict reversals. However, like other Diffusion Threshold Models, once a threshold is reached, a decision can be made (Bogacz et al., 2006; Ratcliff et al., 2009, Yeung & Summerfield, 2012).

The extended DDM has additional elements that increases its parameters in comparison to the original version (Bogacz et al., 2006). One of these additions is allowing drift rate to vary, similar to the Wiener Diffusion Model (Bogacz et al., 2006; Zhang, 2012), thus explaining, using small drift rates, why errors can take longer than correct responses to occur (Bogacz et al., 2006; Zhang, 2012). The second additional element is that the starting point can be variable in the extended DDM (Bogacz et al., 2006; Zhang, 2012), which highlights that fast and incorrect decisions can be explained through biased starting points (Bogacz et al., 2006; Zhang, 2012). These extensions allow the model to fit previous decision science data more adequately (Bogacz et al., 2006; Zhang, 2012), and may also allow the decision maker to adapt to the environment, which fits well with bounded rationality theories (Simon, 1965). The potential use of this mathematical model is exemplified by the fact that other researchers have used it as a "*benchmark*" for comparison with alternative decision making models (Zhang, 2012, p.4). In addition, this tradition of adapting Diffusion Threshold Models highlights that practical modifications

are conventional, and may be necessary for the Diffusion Threshold Model to fit within a legal framework.

3.1.3. Current study.

The thesis has so far discussed potential models from decision science that may have applications within a juror context. The literature review (Chapter Two) discussed previous juror decision making models and research, and it was found that there was a lack of research investigating jurors within a three-verdict system. In addition, the literature review proposed that current juror decision making models, such as the Story Model, are naïve, as they assume that all jurors use all of the evidence provided in a trial (Carlson & Russo, 2001; Simon, 2004). This led to a review of decision making models born out of decision science, rather than forensic psychology, as the utility of said models has been demonstrated in other applied settings, such as economics (Tversky and Kahneman, 1974).

The first decision science models discussed related to rational models of decision making, such as Bayesian analysis; but it was found that such models are poor descriptors of juror processes (Pennington & Hastie, 1983). The literature review then progressed to outline Tversky and Kahneman's (1974) heuristics and biases programme and how it might apply to juror decision making. Research by Chapman and Bornstein (1996) and Esqueda et al. (2008) has highlighted that some heuristics, such as the representativeness heuristic and the anchoring and adjustment heuristic, may be able to explain the biases that have been observed in juror decision making. However, the ecological validity of the programme has been questioned (Gigerenzer & Goldsetin, 1996). This led to the fast and frugal approach being reviewed.

Gigerenzer and Goldstein (1996) proposed that fast and frugal heuristics are more realistic than both rational decision making models and the heuristics described by Tversky and Kahneman (1974). Dhami and Ayton (2001) found that fast and frugal processes are used by judges when making decisions; therefore, it could be argued that jurors may use similar processes, as their lack of experience may promote fast and frugal heuristics (Gigerenzer & Goldsetin, 1996). A paper by Lee and Cummins (2004) was then evaluated, which highlighted that both rational and heuristic models of decision making could be encompassed by a unified threshold model. In addition, previous research has suggested that decision thresholds may have utility within a juror setting (Kerr, 1993; MacCoun, 1989; Thomas & Hogue, 1976), as varying thresholds allow both frugal and greedy (in terms of information use) juror processes to be explained (Lee & Cummins, 2004).

The literature review within the current chapter found that two separate types of threshold models of decision making existed: the Diffusion Threshold Model and the Counter Threshold Model (Ratcliff & Smith, 2004). Ratcliff and Smith (2004) highlighted that both Counter and Diffusion Threshold Models make decisions once a threshold (i.e., Guilty, Not Guilty and Not Proven) has been reached and that these thresholds can vary, but the way that thresholds are reached allows the models to be differentiated. The Diffusion Threshold Model has a relative stopping rule, meaning that information integration allows thresholds to be reached, whereas Counter Threshold Models have an absolute stopping rule, where information is collected in separate counters (i.e., Guilty, Not Guilty and Not Proven), each with separate thresholds, and the threshold that is reached first initiates a response (Ratcliff & Smith, 2004). Within each of the different types of threshold model there are many different subtypes, as discussed previously. Each of these sub-types of threshold model, however, either reach a threshold using information integration or through using evidence placed in individual evidence counters, thus the current study will compare whether evidence placed in individual counters or

information integration allows thresholds to be reached. Nevertheless, the current literature review on threshold models of decision making could not highlight which model would best represent juror decision making processes; the current study was therefore designed to investigate this.

The current research may have novel applications for both decision science and forensic psychology. For instance, the Diffusion Threshold Model has never been studied outwith binary decision tasks (Zhang, 2012) or within a juror setting. Ratcliff and McKoon (2008) proposed that the Diffusion Threshold Model might not explain decisions that involve multiple stages, that have more than two forced choice decisions, and that are slower than 1500 milliseconds; whereas Lee and Cummins (2004) found that threshold models of decision making could apply to decisions made in complex environments. The current study, therefore, has two questions that fall under an overarching research aim. First, can threshold models apply to complex decisions with tertiary outcomes? Second, which threshold model of decision making best applies to juror decision making? The overarching aim of the current chapter is to investigate which threshold model of decision making best describes juror decision making within the Scottish three-verdict system.

In order to address the above research aim, the current thesis investigated how thresholds are reached through measuring likelihood of guilt ratings after each piece of evidence, and through determining the counter (Guilty, Not Guilty and Not Proven), cue utilisation (how many pieces of evidence were used) that each piece of evidence was placed. Likelihood of guilt ratings varied from 1-100 (with higher estimates suggesting a higher belief of guilt), similar dependent measures have been used by previous researchers when investigating information integration (see Ostrom, Werner, & Saks, 1978). This measure was compared across the decision process using three distinct points: prior point, the likelihood of guilt given before any information had been seen; the threshold point, the likelihood of guilt rating given once a decision can be made; and the last point, the

likelihood of guilt rating given after all the evidence had been seen. The prior, threshold, and last points were named collectively as likelihood points in the current thesis, and were used as similar points had been used in previous research (Ratcliff & Smith, 2004). In addition, participants were asked to rate how they interpreted each piece of evidence in relation to the verdict it supported (i.e., Guilty, Not Guilty or Not Proven), which allowed the counter (Guilty, Not Guilty or Not Proven) that each piece of evidence had been placed in to be determined. Thresholds were assessed through participants stating, once they had given a verdict (Guilty, Not Guilty or Not Proven), the last piece of evidence they needed to reach a verdict. This last piece of evidence needed allowed both the threshold point and the ratings (Guilty, Not Guilty or Not Proven) of the last piece of information needed to be generated. In summary, the current study was designed to test how thresholds were reached.

To test how thresholds were reached three hypotheses were created:

1. There will be a significant interaction between Verdict Given and likelihood points in relation to likelihood of guilt ratings.
2. There will be significant associations between the ratings of the last piece of information needed (Guilty, Not Guilty and Not Proven) and the verdicts given (Guilty, Not Guilty and Not Proven).

The first hypothesis is testing whether or not information integration allows distinct thresholds to be reached. If information integration does allow thresholds to be reached, it is expected that likelihood of guilt ratings will differ significantly between the prior point and the threshold point across each of the verdict types (Guilty, Not Guilty and Not Proven). In addition, if distinct thresholds do allow verdicts to be given, it is expected that the threshold points will be found to be distinct across the verdicts in relation to

likelihood of guilt ratings. If these expected results are found, then the hypothesis can be supported, which will provide evidence for the Diffusion Threshold Models ability to describe juror decision processes within a three-verdict system. In previous studies investigating the Diffusion Threshold Model, however, a decision is made once a threshold has been reached, whereas jurors may still be provided with evidence post-threshold. The current study, therefore, investigated whether or not drift changed post-threshold through adding an additional point called the last point to the Diffusion Threshold Model. It is expected that this hypothesis will be supported, as Ratcliff and Smith (2004) have previously found that the Diffusion Threshold Model can be used to describe decision making processes.

The second hypothesis is testing whether or not evidence placed in individual counters allows thresholds to be reached. For example, if the number of Guilty verdicts given correlates with the number of times the last piece of evidence needed was rated as Guilty, then this would suggest that evidence placed in Guilty Counters allowed the Guilty Thresholds to be reached, which then allowed a Guilty verdict to be given. Therefore, if significant associations exist between the ratings of the last piece of information needed (Guilty, Not Guilty and Not Proven) and the verdicts given (Guilty, Not Guilty and Not Proven), then this will allow the second hypothesis to be supported, thus providing support for the Counter Threshold Models ability to describe juror decision processes within a three-verdict system. Research from Thomas & Hogue (1976) suggests that significant associations will be found, as they propose that information collected in individual counters allows thresholds to be reached.

In summary, by testing these hypotheses in a quasi-experimental setting, the researcher will empirically evaluate which threshold model of decision making best describes juror decision making within the Scottish three-verdict system.

3.2. Method

3.2.1. Design.

This research used a quasi-experimental design throughout. However, two designs were incorporated into this quasi-experiment to test both of the threshold model's ability to describe juror decision processes. A 3 x 3 factorial design was used to test the Diffusion Threshold Models ability to represent juror decision processes. In addition, a correlation design was used to test the Counter Threshold Models ability to represent juror decision processes. The design and measures for each of the two specific models are presented below.

3.2.1.1. *Diffusion Threshold Model.*

A 3 x 3 mixed factorial design was applied, in which the variable of Verdict Given (Guilty, Not Guilty, Not Proven) was the between-subjects factor and the variable of likelihood point (prior, threshold, last) was the within-subjects factor, to test the Diffusion Threshold Model's ability to represent juror decision processes. The Verdict Given variable was used as a factor to categorise participants in the current chapter. Participants were categorised into the verdicts they gave at the end of each vignette (Guilty, Not Guilty and Not Proven). When participants opted for a Not Guilty verdict, they were placed in the Not Guilty condition; when they opted for a Guilty verdict, they were placed in the Guilty condition; and when they opted for a Not Proven verdict, they were placed in the Not Proven condition. This design was chosen as previous researchers have compared dependent measures, such as estimates of guilt and decision difficulty, across the verdicts that jurors opted for (see, for example, Hope et al., 2008, p.245; Smithson et al., 2007, p.492). The variable of Verdict Given was originally a within-subjects variable. However, not everyone gave each of the respective verdicts (Guilty verdicts given by 59 participants; Not guilty verdicts given by 39 participants; and, Not Proven verdicts given

by 58 participants). Therefore, the mean for each of the likelihood points for each participant was calculated within each of the verdict types, allowing the participants to only be counted once within each of the verdict groups. The dependent variable (DV) used here was the likelihood of guilt rating. Supplementary analysis tested whether the Verdict Given variable (Guilty, Not Guilty and Not Proven) could be predicted using two predictor variables: 1) cue utilisation; and, 2) threshold point. Here it should be noted that the verdict given variable was used as a criterion variable and not as a factor as in the ANOVA analysis, thus changing how the verdict given variable was conceptualised. This analysis was conducted to confirm whether or not thresholds allow verdicts to be reached.

3.2.1.2. *Counter Threshold Model.*

A correlational design was utilised (within the same quasi-experiment) to test the Counter Threshold Models ability to represent juror processes. Six co-variables were measured: the number of times the last piece of evidence needed was rated as Guilty, the number of times the last piece of evidence needed was rated as Not Guilty, the number of times the last piece of evidence needed was rated as Not Proven, the number of Guilty verdicts given, the number of Not guilty verdicts given, and the number of Not Proven verdicts given.

3.2.2. Participants.

Sixty participants (31 females) took part. The age range was 18–57 years, with a mean age of 26.8 ($SD = 9.6$) years. Twenty-one of the participants were students, the sample also consisted of other occupations, including but not limited to: semi-skilled workers and support/care workers. Participants were recruited via opportunistic sampling through posters placed throughout Edinburgh Napier University and through advertisements

being placed on social media sites (e.g., Facebook). To ensure ecological validity, participants had to be eligible for jury duty in Scotland, and were therefore omitted from the study if they: were under 18 years old; had been sentenced in court in the last five years; had been imprisoned for three months in the last seven years; or were not on the electoral role (Scottish Courts and Tribunal Service, 2015).

Overall, 540 decisions were made (60 participants * nine vignettes), this is relatable to a respected paper on the decision making of judges that analysed 342 decisions (Dhami, 2003), and indicates that the study is adequately powered.

3.2.3. Materials.

3.2.3.1. Vignettes.

Nine homicide vignettes were shown to participants using the experiment-software package *SuperLab version five* (Cedrus Corporation, 2014). The order of these vignettes was balanced across participants. For all of the vignettes, prosecution evidence was presented first, followed by defence, as this is the standard in the legal system.

3.2.3.1.1. Vignette development.

The current section will outline how the vignettes were developed. The vignettes in the present study were drawn from real life cases collected from media articles. All vignettes were based on real life homicide trials, three of which resulted in Guilty verdicts, three Not Proven, and three Not Guilty. In addition, the author of this thesis attended real life court trials to observe how a trial is conducted; this was done to help the author make the vignettes seem realistic.

There were two reasons as to why the current research only used vignettes based upon real life homicide cases. First, to reduce confounding variables relating to trial type, as

previous research had highlighted that the more severe a case is then the more information is needed to support a verdict (Freedman, Krismer, MacDonald, & Cunningham, 1994, cited in Smithson et al., 2007). Consequently, by only using homicide vignettes, threshold levels would only be influenced by the evidence presented in the vignettes rather than the different trial types. Second, homicide vignettes were used because Not Proven verdicts are used more often with such cases (Hope et al., 2008).

Each stance (prosecution vs defence) presented between 5-9 pieces of evidence. This varying number was chosen for two reasons: 1) so that memory constraints did not influence which cues were remembered within each of the stances when the participants were making their final verdicts, which links with Miller's (1956) 7+-2 rule; and, 2) the number varied for generalisability purposes, as some real life cases present more information than others.

Literature on vignette development (i.e., Ashill & Yavas, 2006; Heverly, Fitt, & Newman, 1984) was consulted when designing the specific vignettes. The vignettes were designed to be of similar length to reduce attentional biases. On average, the vignettes were 447.78 (Minimum = 263; Maximum = 518) words long. A one-way within-subjects ANOVA highlighted that there was no significant differences in relation to the number of words used in the vignettes when grouping the vignettes into the original verdicts (i.e., Guilty ($M = 452.33$, $SD = 57.13$), Not Guilty ($M = 325.33$, $SD = 100.27$), and Not Proven ($M = 422.67$, $SD = 21.22$; three vignettes for each verdict type) that were given in the real life trials [$F (2, 4) = 2.25$, $p = .22$, $\eta_p^2 = 53$]. The information in each of the vignettes fell within a similar theme, with the consistency of this information, across vignettes, being assessed by the author (LC) and one of their supervisors (JM); they evaluated and compared the evidence between the vignettes. The evidence from the prosecution was presented prior to the defence evidence in every trial; this was conducted for ecological validity purposes, as mentioned above (Murray et al., 2016). The gender and ages of the

victims and defendants across the vignettes were comparable; please see Appendix B for more information on the demographics of the defendants and the victims in each of the vignettes.

3.2.3.1.2.   Pilot testing for confounding variables in the vignettes.

Initially, piloting was performed to make sure that the vignettes were consistent across conditions (i.e., Guilty, Not Guilty, and Not Proven verdict; three vignettes for each verdict type) in regard to severity, realism and familiarity ratings; as the vignettes used were based on real life trials. The conditions of Guilty, Not Guilty and Not Proven in the pilot were based upon the verdicts given by the real life jury in the trials that the vignettes were based upon (i.e., the vignettes were categorised based on the verdicts given by the real life juries). The DVs of severity, realism and familiarity were measured from one (low) to five (high), and a cumulative value was gathered within each of the conditions. The ratings for severity were similar across the conditions (Guilty M = 12.4, SD = 1.5; Not Guilty M = 12.1, SD = 1.7; and, Not Proven M = 12.1, SD = 1.7). The ratings for familiarity were similar across the conditions (Guilty M = 6, SD =13.1; Not Guilty M = 6.2, SD = 3.7; and, Not Proven M = 5.1, SD = 3.4). The ratings for realism were similar across the conditions (Guilty M = 10.8, SD = 2; Not Guilty M = 11.7, SD = 2; and Not Proven M =11.5, SD = 2.5). Three one-way within subjects' Analyses of Variance (ANOVA) were conducted to explore the DVs (severity, realism, and familiarity) across the three levels of Verdict Given (Guilty, Not guilty, and Not Proven). There was no significant main effect of verdict for severity [$F_{(2, 30)}$ = .55, p =.58, η_p^2= .04], realism [$F_{(2, 30)}$ = 1.65, p=.21, η_p^2= .10], or familiarity [$F_{(1.36, 20.47)}$ = 2.11, p = .16, η_p^2= .12]. Therefore, the variables of severity, realism and familiarity were not acting as confounding variables in the current study.

3.2.3.2. Measurement of thresholds and information integration for Diffusion Threshold Model analysis.

The likelihood point variable was created through measuring the likelihood of guilt rating given: before any evidence had been presented (prior), once a decision could be made (threshold), and once all the evidence had been shown. Prior and last points were measured at the same place for all participants (i.e., before any and after all the evidence had been shown, respectively), whereas the threshold likelihood point was measured by asking participants to state after which piece of information they could have made their decision, this also allowed cue utilisation to be measured. In addition, the prior point highlighted if participants were starting with pre-trial biases (Estrada-Reynolds et al., 2015), and the threshold point symbolised when a relative stopping rule had been crossed (Ratcliff & Smith, 2004). Participants also stated, after each vignette, which verdict (Guilty, Not Guilty or Not Proven) they thought was the most appropriate; this allowed the independent variable of Verdict Given to be created.

Participants saw nine vignettes, allowing each of the likelihood points (prior, threshold and last) and cue utilisation scores to be averaged within Guilty, Not Guilty, and/or Not Proven verdicts. For example, if a participant gave four Guilty verdicts, each of the likelihood (prior, threshold and last) points would be averaged across these four verdicts. If a participant gave four Not Proven verdicts and one Not Guilty verdict, the same averaging process would be conducted.

The likelihood of guilt rating ranged from 1-100: one symbolised definitely Not Guilty, 50 represented Not Proven, and 100 represented that the defendant was definitely Guilty; participants were told this during the experiment. Other authors have used a similar 1-100 scale to study decision making (Price & Dahl, 2014; Thomas & Hogue, 1976). Cue utilisation was measured by asking participants to state the last piece of evidence they needed to reach their verdict, all the information up until this point was used within the

cue utilisation measure. Cue utilisation had the potential to be as low as one or as high as all the cues provided in the vignette, the amount of cues presented in each of the different vignettes ranged from 10 to 18.

3.2.3.3. *Measurement of co-variables for the Counter Threshold Model analysis.*

Participants were asked to rate each of the pieces of evidence as either Guilty, Not Guilty, or Not Proven and to state the last piece of information they needed to reach a verdict, thus created three co-variables (one for each type of evidence ratings) relating to the last piece of evidence needed to reach a verdict. This was to mirror the Counter Threshold Model where evidence is gathered in separate counters, and the counter that allows its threshold to be reached first allows a response to be given. Participants also stated, after each vignette, which verdict they thought was the most appropriate. This allowed three co-variables for each verdict type to be created. In addition, participants read nine vignettes, which allowed the amount many times each verdict (Guilty, Not Guilty and Not Proven) was given over the nine vignettes to be counted. This also allowed the amount of times each evidence type allowed a threshold to be reached (Guilty, Not Guilty and Not Proven) over the nine vignettes to be counted. For example, if a participant gave five Guilty verdicts over the nine vignettes, then their cumulative score for the number of Guilty verdicts given would be five. Further, if a participant rated the last piece of evidence needed as Not Guilty four times, then their cumulative score for how many times the last piece of evidence needed was rated as Not Guilty would be four.

Overall, six co-variables were measured. As previously mentioned, three of these co-variables related to the verdict that was given: 1) how many Guilty verdicts were given over nine vignettes; 2) how many Not Guilty verdicts were given over nine vignettes; and, 3) how many Not Proven verdicts were given over nine vignettes. Further, the other

three co-variables related to the last piece of evidence needed and how it was rated (i.e., placed in a specific counter) over the nine vignettes: 4) how many times the last piece of evidence needed was placed in a Not Proven counter; 5) how many times the last piece of evidence needed was placed in a Guilty counter; and, 6) how many times the last piece of evidence needed was placed in a Not Guilty counter.

3.2.3.4. *Information sheet, consent form and debrief.*

Standardised information sheets, consent forms and debriefing sheets were employed with all participants. The information sheet told participants that their data would be anonymised and that that they had the right to withdraw at any time. Participants were also told that their results would be used in relation to future court appeals, as the vignettes were based upon real life cases. This slight deception was added into the information sheet so that participants would take the cases seriously. A debrief sheet was provided at the end of the study to provide further information on the purpose of the research and to inform participants that the data was not going to be used by lawyers for appeals. The participants were also asked to tick a box on the debrief sheet if they still wanted their data to be used; all participants ticked this box. This allowed the participants to withdraw in a polite and simple manner following the disclosure of the deception.

3.2.3.5. *Legal inventory/demographics questionnaire.*

This inventory was developed based on Scottish juror eligibility, as described in the participants section, and allowed participants who could not take part in a real life jury to be excluded from the current study. The demographics questionnaire also collected details such as occupation, age and gender.

3.2.4. Procedure.

Participants read the information sheet and completed the consent form in a quiet room. They were told that their data would be used for court appeals (a mild deception) so that they would believe that their responses had consequences. They then completed the legal inventory and, if eligible to take part, were given on-line standardised instructions for the study from within the experiment-software package (i.e., *SuperLab version five*). The procedure for each vignette was identical and was as follows. Participants were provided with an opening statement to provide context to the vignette. Participants were then asked to give a prior likelihood of guilt rating. Participants were reminded how to rate the evidence (either Guilty, Not Guilty or Not Proven) and which buttons to press to do this prior to evidence being presented. The G button corresponded to rating the evidence as Guilty, the N button corresponded to rating the evidence as Not Guilty verdict, and the P button insinuated that the evidence did not show guilt or innocence (Not Proven). Next, participants were shown the pieces of evidence (cues), with the prosecution evidence presented first, followed by defence evidence (Englich et al., 2005). Cross-examinations were not included to avoid problems that could arise by the materials becoming too complex. After each piece of evidence, participants rated the evidence according to the verdict it supported and gave a likelihood of guilt rating. Once each piece of evidence had been read and evaluated, participants were asked to give a final verdict: Guilty (G), a Not Guilty (N) or a Not Proven (P) verdict. Then, participants were asked to identify the last piece of evidence that they needed to make their decision. This process was repeated for each of the nine vignettes. Once all nine vignettes had been completed, participants read through the debrief sheet. The task took on average 60 minutes to complete.

3.2.5. Ethics.

This study was granted ethical approval by the School of Applied Sciences Research Integrity committee at Edinburgh Napier University.

3.3.   Results for the First Quasi-Experiment

This section will present an exploration of juror decision making within a three-verdict system. First, descriptive statistics will be presented for each of the key dependent variables across the different types of analyses; details about data preparation will also be discussed. The results section will then progress to the analysis that tested which threshold model (i.e., the Diffusion Threshold Model or Counter Threshold Model) best represented the juror decision making data. The ability of the Diffusion Threshold Model to represent the decision making was investigated using an ANOVA and a Generalised Estimating Equation, whereas the ability of Counter Threshold Model to represent the decision making data was tested using three Pearson's correlations.

3.3.1.   Cue utilisation analysis.

To test whether or not threshold models of decision making were an appropriate metaphor for juror decision making processes, the number of pieces of evidence that were used by participants to reach a verdict must be considered.

3.3.1.1.   Descriptive statistics for the cue utilisation measure across each of the verdict types.

The cue utilisation data symbolised the number of pieces of evidence that were needed to reach a threshold. The data were normally distributed, with minimal outliers, and

therefore parametric testing could be applied (Laerd Statistics, 2017). Table 1 shows the descriptive statistics for cue utilisation. These statistics highlighted that cue use in Guilty verdicts was more frugal in comparison to its acquittal counterparts.

Table 1

Descriptive statistic for cue utilisation across the different verdicts given in the three-verdict system.

Verdict	Mean	Standard Deviation
Guilty	6.00	2.17
Not Proven	11.35	2.15
Not Guilty	11.53	2.55

3.3.2. Diffusion Threshold Model analysis.

The Diffusion Threshold Model was tested using a 3 x 3 mixed factorial ANOVA, with the between-subjects factor being verdict (Guilty, Not Guilty and Not Proven) and the within-subjects factor being likelihood point (prior, threshold and last), and the DV being the 1-100 likelihood of guilt rating. In addition, the efficacy of the Diffusion Threshold Model was further tested by investigating whether or not Diffusion Thresholds could predict the verdict that was given. Prior to presenting the findings, a description of the data is presented for each of the analyses.

3.3.2.1. *Descriptive statistics for the Diffusion Threshold Model.*

Participants saw nine vignettes, allowing each of the likelihood points (prior, threshold and last) to be averaged within Guilty, Not Guilty, and/or Not Proven verdicts. For example, if a participant gave four Guilty verdicts, each of the likelihood (prior, threshold

and last) points would be averaged across these four verdicts. If a participant gave four Not Proven verdicts and one Not Guilty verdict, the same averaging process would be conducted. From the data minimal outliers were found. It was therefore deemed appropriate to conduct parametric tests (Laerd Statistics, 2017). Table 2 presents the descriptive data for the prior (likelihood of guilt given before any evidence was presented), threshold (likelihood of guilt given when a decision could be reached) and last (likelihood of guilt once all the information was shown) points across each of the verdict types.

Table 2

Descriptive statistics for the likelihood points across each of the different verdicts given.

	Likelihood Points		
Verdict	Prior	Threshold	Last
Guilty:			
Mean	47.24	83.94	81.81
Standard Deviation	14.11	9.60	11.47
Not Guilty:			
Mean	41.46	49.65	39.18
Standard Deviation	20.21	18.23	15.12
Not Proven:			
Mean	44.92	62.57	58.04
Standard Deviation	12.13	11.20	9.90

Predictor and criterion variables testing the efficacy of the Diffusion Threshold Model.

No outliers were found across both of the predictor variables. These data were gathered by collecting threshold, verdict and cue utilisation responses from 60 participants over nine vignettes; only two responses were missing as two participants did not give a verdict on one of their vignettes. Table 3 presents the descriptive data for both of the predictor variables (cue utilisation and threshold point), and the frequency data for each of the categories within the outcome variable of Verdict Given (i.e., Guilty verdicts, Not Guilty verdicts and Not Proven verdicts).

Table.3.

Descriptive statistics for predictor variables and frequency count of criterion variables.

Predictor Variable	Mean	Standard Deviation
Cue utilisation	9.05	4.18
Threshold Point	69.68	21.86
Criterion variable	Frequency	
Guilty Verdicts	245	
Not Guilty Verdicts	79	
Not Proven Verdicts	214	
Total	538	

3.3.3. Counter Threshold Model analysis.

To test the efficacy of the Counter Threshold Model, three Pearson's correlations were carried out. These correlations investigated if information that had been placed in a specific counter - which was tested through asking participants to rate if the information supports a Guilty, a Not Guilty or a Not Proven verdict - allowed a threshold to be reached, and thus a verdict to be given. Specifically, the current analyses tested if the

piece of evidence that allowed a threshold to be reached correlated with the appropriate verdict.

3.3.3.1.   *Descriptive statistics for the Counter Threshold Model.*

The data were collected using categorical data (i.e., Guilty, Not Guilty and Not Proven Verdict Given /last piece of evidence needed). For the current analysis, the frequency of how many times each verdict type was given by each of the participants was counted over the nine vignettes, and the frequency for each of the different ratings (i.e., Guilty, Not Guilty and Not Proven) that could be given for the last piece of evidence needed was also counted for every single participant over the nine vignettes. Furthermore, parametric analysis was conducted as these cumulative scores allowed the data to be treated as a numerical scale data. Table 4 presents descriptive statistics for the amount of times each of the verdict types (Guilty, Not Guilty, and Not Proven) were given over the nine vignettes, and for the amount of times the last piece of evidence needed was placed in each of the respective counters (i.e., Guilty, Not Guilty or Not proven) over the nine vignettes; that is how many times was the last piece of evidence needed rated as Guilty, how many times was the last piece of evidence needed rated as Not Guilty, and how many times was the last piece of evidence needed rated as Not Proven.

Table 4

Descriptive statistics for each of the co-variables testing the Counter Threshold Model.

Variable	Mean	Standard Deviation
The Number of Times the Last Piece of Evidence Needed was Rated as:		
Guilty	4.02	1.93
Not Guilty	1.78	1.68
Not Proven	3.15	2.09
The Number of Times the Verdict Given was:		
Guilty	4.03	1.74
Not Guilty	1.30	1.31
Not Proven	3.62	1.99

3.3.4. Inferential analysis of cue utilisation across the verdict types.

A one-way between-subjects ANOVA was carried out comparing cue utilisation across the different verdict types to see if thresholds differed in relation to how many pieces of evidence were needed to reach them. There was a significant difference in cue utilisation across the three-verdict types [F (2, 155) = 544.91; p <.001; η_p^2 =.58]. Post hoc Tukey's tests highlighted that significantly fewer cues were utilised when a Guilty verdict was given in comparison to when Not Proven (p<.001) and Not Guilty (p<.001) verdicts were given. There were no significant differences (p = .93) in cue utilisation between Not Guilty and Not Proven verdicts. The cue utilisation analysis does not directly relate to any of the hypotheses and is therefore exploratory in nature. Nevertheless, the results highlighted that thresholds may vary in regard to cue utilisation.

3.3.5. Inferential analysis of Diffusion Threshold Model.

The variable of Verdict Given was originally a within-subjects variable. However, not everyone gave each of the respective verdicts (Guilty verdicts given by 59 participants; Not guilty verdicts given by 39 participants; and, Not Proven verdicts given by 58 participants). Therefore, the mean for each of the likelihood points for each participant was calculated within each of the verdict types, allowing the participants to only be counted once within each of the verdict groups.

A 3 x 3 Mixed ANOVA, with Verdict Given (guilty, not guilty, not proven) as the between-subjects factor and likelihood point (prior, threshold, last) as the within-subjects factor, was conducted. A significant main effect of Verdict Given was found [$F_{(2,153)}$ = 110.5, $p<.001$, $\eta_p^2=.59$]. Tukey post hoc tests highlighted that Guilty verdicts had significantly higher likelihood ratings ($M = 71$; $SD = 11.73$) than Not Guilty verdicts ($M = 43.4$; $SD = 17.85$ $p <.001$) and Not Proven verdicts ($M = 55.2$; $SD = 11.08$, $p <.001$). Not Proven verdicts had significantly higher likelihood ratings than Not Guilty verdicts ($p <.001$).

There was also a significant main effect of likelihood point [$F_{(1.6, 243.5)}$ =122.4, $p <.001$, $\eta_p^2=.44$]. Bonferroni post hoc tests revealed that the prior likelihood point ($M = 44.5$; $SD = 15.29$) was significantly lower in relation to likelihood of guilt ratings than both the threshold likelihood point ($M = 65.4$; $SD =18.82$, $p <.001$) and the last likelihood point ($M = 59.7$; $SD = 20.68$, $p <.001$). The threshold likelihood point was significantly ($p<.001$) higher in terms of likelihood of guilt ratings than the last likelihood point.

A significant interaction between the likelihood points and the verdicts given was found across the likelihood of guilt measure [$F_{(4,306)} = 33$, $p <.001$, $\eta_p^2=.30$]. See Figure 1 for a visual representation of this interaction.
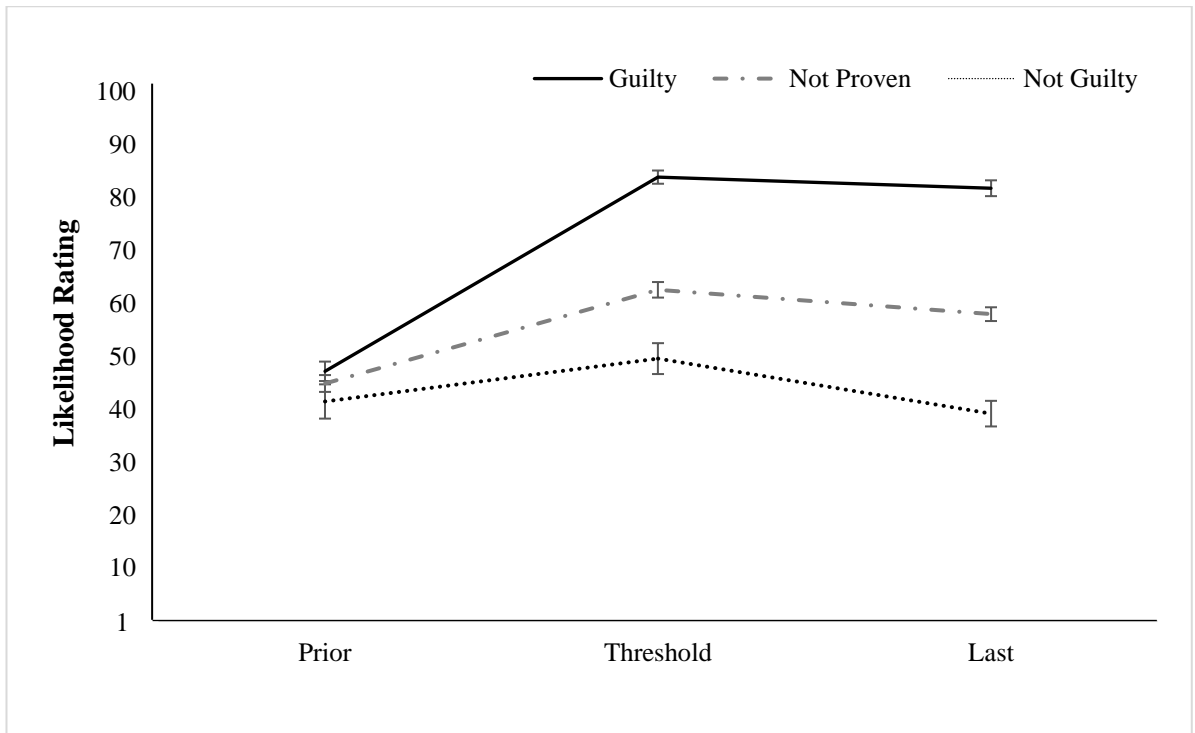
Figure 1. Interaction between verdicts given and the likelihood of guilt points in the three-verdict system.

Figure.1 shows that the prior likelihood was similar across the verdicts. The Guilty threshold point was highest, followed by the Not Proven threshold point, and the Not Guilty threshold point was the lowest. The last likelihood point showed a similar pattern.

Simple main effects showed that for Guilty verdicts, the prior point was significantly lower than the threshold point ($p <.001$) and last point ($p <.001$) in relation to likelihood of guilt ratings. The threshold point and last point were not significantly different from one another in regard to likelihood of guilt ratings ($p =.17$).

When investigating Not Proven verdicts, it was evident that the prior point was significantly lower than the threshold point ($p <.001$) and the last point ($p <.001$) in regard to likelihood of guilt ratings. The threshold point was significantly higher than the last point ($p <.01$) in relation to likelihood of guilt ratings.

For Not Guilty verdicts, it was shown that the prior point was significantly lower than the threshold point ($p <.01$) when investigating likelihood of guilt ratings. The prior point did

not significantly differ from the last point ($p = .45$) when studying likelihood of guilt ratings. However, the last point was significantly lower than the threshold point ($p < .001$) in relation to likelihood of guilt ratings.

When investigating the prior point, Guilty verdicts did not differ significantly from Not Proven ($p = .41$) or Not Guilty ($p = .07$) verdicts in relation to likelihood of guilt ratings. Not Proven and Not Guilty verdicts did not differ significantly ($p = .27$) from one another at the prior point in relation to likelihood of guilt ratings.

For the threshold point, Guilty verdicts had a significantly higher likelihood of guilt rating than both Not Proven ($p < .001$) and Not Guilty ($p < .001$) verdicts. Not Proven verdicts were significantly ($p < .001$) higher than Not Guilty verdicts in relation to the likelihood of guilt ratings given at the threshold point.

Finally, in relation to the last point, Guilty verdicts had significantly ($p < .001$) higher likelihood of guilt ratings in comparison to both Not Proven and Not Guilty verdicts. The last point was significantly ($p < .001$) higher in Not Proven verdicts than it was in Not Guilty verdicts in relation to likelihood of guilt ratings. In summary, the results highlighted that decisions are reached through thresholds and information integration.

Post-hoc power analysis was run using the software G*power (Faul, Erdfelder, Lang, & Buchner, 2007). The sample size was set to 60, and the analysis highlighted that the ANOVA for the diffusion analysis was adequately powered, with an actual power of .99.

3.3.6. Testing the efficacy of the Diffusion Threshold Model by investigating if threshold point and cue utilisation allow the Verdict Given to be predicted.

First, Kendall's Tau B correlations were conducted to investigate if cue utilisation and the threshold point were significantly correlated with the verdict that was given. Cue utilisation was chosen as one of the predictor variables as it highlights how frugal the decision maker's threshold was, and threshold point was chosen as it highlights which threshold was reached by the decision maker. It was found that there was a significant and positive association between Verdict Given and cue utilisation (Tb (538) = .49, p <.001). Guilty was coded as one, Not Proven was coded as two, and Not Guilty was coded as three, which showed that the more cues used, the more likely it was for an acquittal verdict to be reached. It was also found that there was a significant and negative correlation between Verdict Given and threshold points (Tb (538) = -.545, p <.001). Therefore, the higher the threshold point was the more likely it was for a Guilty verdict to be give, whereas the lower the threshold point was, the more likely it was for an acquittal verdict (Not guilty and Not Proven) to be given.

To follow up these correlations, a Generalised Estimating Equation (GEE) was conducted as said test allows regressions to be conducted on repeated measures designs that do not meet non-parametric assumptions (Ballinger, 2004; Estrada-Reynolds et al., 2015; Field, 2013). In the current data set, the cases were not independent, as participants gave responses over nine vignettes, meaning that assumptions relating to other tests (i.e., Multinomial logistic regression) would be violated (Ballinger, 2004; Estrada-Reynolds et al., 2015; Field, 2013). However, GEE's allow multinomial logistic regressions to be conducted on repeated measures data (IBM knowledge Center, 2017). In the GEE, case

(from one to 60) was added as the subject effect and trial (from one to nine) was added to the within-subject effect. The quasi-likelihood under independence model criterion (QLUIMC) was not calculated as the log quasi-likelihood function cannot be obtained with a multinomial distribution, and goodness-of-fit statistics are not valid for GEE's (IBM knowledge Center, 2017). The QLUIMC is used to decide which correlation matrix best fits the data, but because it was not available the accuracy of the model was compared across each of the correlation matrices. It was found that the model predicted the Verdict Given most accurately when the independent correlation matrix was used (74.3%) in comparison to when other correlation matrices were used (unstructured correlation matrix = 73%; auto-regressive correlation matrix = 74% of data). In addition, the GEE output could not be computed under the exchangeable correlation matrix, and the m-dependent correlation matrix was not appropriate for the current data set as consecutive measurements did not have the same correlation coefficient (see appendix B table 18 for correlation coefficients of consecutive measurements; IBM Knowledge Center, 2017). Therefore, the independent correlation matrix was chosen.

It was found that the threshold point significantly predicted the Verdict Given variable [$x2$ (1) = 87.66, p<.001]. It was found that cue utilisation was also a significant predictor of the Verdict Given variable [$x2$ (1) = 65.12, p <.001]. Further, the model predicted the Verdict Given accurately in 74.3% of cases; please see table 5 for the parameter estimates.

Table 5

Parameter estimates for in Generalised Estimating Equations testing efficacy of Diffusion Threshold Model.

Variable	B coefficient
Threshold Latent Variable 1	-2.693
Threshold Latent Variable 2	0.706

Threshold Point	-0.069
Cue Utilisation	0.269

The threshold for the latent variables showed where the latent variables were cut to produce the three categories (Guilty, Not Guilty and Not Proven) of the outcome variable: below -2.693 on the y axis represented Guilty verdicts; above 0.706 on y axis represented Not Guilty verdicts; and, between the two values mentioned represented Not Proven verdicts (Idre, 2017). The results above highlighted that for every one unit increase in threshold point, it is expected that there will be a .069 decrease in the log odds of being in a higher level of Verdict Given, given that all of the other variables in the model are held constant. Further, for every one unit increase in cue utilisation, it is expected that there will be a .269 increase in the log odds of being in a higher level of Verdict Given, given that all of the other variables in the model are held constant. In other words, for every unit increase in threshold point, there was an increased likelihood of giving a Guilty verdict. Further, for every unit increase in cue utilisation there was an increased likelihood of giving one of the acquittal verdicts (Not Guilty and Not Proven).

3.3.7. Analysis of the Counter Threshold Model using Pearson's Correlations.

Three Pearson's correlations were carried out across six co variables: 1) the number of Guilty verdicts given and the number of times that the last piece of information needed was rated as Guilty; 2) the number of Not Guilty verdicts given and the number of times that the last piece of information needed was rated as Not Guilty; and, 3) the number of Not Proven verdicts given and the number of times that the last piece of information needed was rated as Not Proven. These three Pearson's correlations were conducted to investigate if evidence placed in specific counters, highlighted through how they were

rated (i.e., Guilty, Not Guilty and Not Proven), allowed specific decision thresholds to be reached, thus allowing particular verdicts to be given.

Significant relationships were found in all three of the Pearson's correlations that were conducted. A significant relationship existed between the number of Guilty verdicts given and the number of times the last piece of information needed was rated as Guilty [$r (60)$ =.82, $p<.001$, r^2=.67]. This is a strong and positive relationship, which indicated that when the last piece of information needed is placed in a Guilty counter it is related to when a Guilty verdict is given, thus providing support to the claim that count information allows Counter thresholds to be reached. There was a significant relationship between the number of Not Guilty verdicts given and the number of times the last piece of information needed was rated as Not Guilty [$r(60)$ =.35, $p=.007$, r^2=.12]. Once again, this is a positive relationship, and suggests that count information allows Counter thresholds to be reached. Finally, there was a significant relationship between the number of Not Proven verdicts given and the number of times the last piece of information needed was rated as Not Proven [$r(60)$ =.51, $p<.001$, r^2=.26]. This also provides support for the Counter Threshold Model.

In summary, the Counter Threshold Model analyses confirmed that each of the respective ratings of the last piece of information (i.e., Guilty, Not Guilty and Not Proven) needed before a threshold was reached shared a relationship with a supporting verdict being given. In other words, when information was placed in a specific counter (e.g., Guilty counter), and said information allowed the decision threshold to be reached, it was more likely that an associated verdict would be given (e.g., Guilty verdict). However, none of the correlation coefficients are one, which creates reasonable doubt over the efficacy of the Counter Threshold Model.

In addition, three post hoc power analyses were conducted using G*power to test the power of each of the three correlational analyses. All three power analyses set the total sample size to sixty. The first G* power analysis investigated the relationship between the how many Guilty verdicts were given and the number of times the last piece of information needed was rated as Guilty, and a power of 1.00 was observed. The second G* power analysis investigated the relationship between the how many Not Guilty verdicts were given and how many times the last piece of evidence needed was rated as Not Guilty, the power calculated was .79. The final G* power analysis investigated the relationship between the how many Not Proven verdicts were given and how many times the last piece of evidence needed was rated as Not Proven, a power of .99 was calculated. Consequently, all the correlations above were adequately powered.

3.4. Discussion

3.4.1. Overall aim.

The aim of the current study was to identify which model of threshold decision making best explains the decision making processes of jurors within a three-verdict system. The discussion will first explore the findings associated with the Diffusion and Counter Threshold Models of decision making. Then, a broader discussion around limitations and future directions will be presented.

3.4.2. Thresholds.

The overarching aim of the current chapter was to investigate which threshold (Diffusion or Counter) model of decision making best describes juror decision making within the Scottish three-verdict system. The current study met this aim by investigating the final verdicts that were given, decision thresholds, likelihood of guilt ratings, and how each

piece of evidence was interpreted (i.e., whether cues supported a Guilty, a Not Guilty or a Not Proven verdict), this allowed the Diffusion and Counter Threshold Models to be compared in regard to how well they can be applied to a three-verdict juror setting. In addition, this investigation aimed to provide greater insight into the cognitive processes of juror decision making, rather than a sole emphasis on outcomes, as has been much of the focus in the existing literature. The current study also investigated the process behind the 'unique' Not Proven verdict option, currently used within the Scottish legal system.

The first hypothesis was accepted, as there was a significant interaction between Verdict Given and likelihood points in relation to likelihood of guilt ratings. It was found that likelihood thresholds were different across the verdicts (i.e., relative stopping rule). This suggests that the reaching of a likelihood boundary informed the responses that were given (Wells, 1992). The last points were also significantly different across the verdicts, this proposes that decisions could be made once a threshold was reached, and additional information was not necessary. Furthermore, the acceptance of this hypothesis suggests that for each of the verdicts, evidence accumulated until a threshold was reached and that the evidence acquired after this point did not affect the response that was given, hinting at a threshold bias (i.e., a pre-decisional evidence distortion to support a leading verdict/threshold; Carlson & Russo, 2001). However, if strong evidence is provided, this pre-decisional bias towards a favoured threshold may be attenuated, thus allowing a verdict reversal to occur (De La Fuente, De La Fuente, & García, 2003).

The prior points for each of the verdicts were similar, suggesting that jurors in a three-verdict system begin a trial unsure over the guilt of the defendant, but do have some preference towards the defence (see Figure.1). Ostrom et al. (1978) found similar results, with jurors starting a trial with an assumption of innocence. The threshold points in the current study were significantly different across the various verdicts given, suggesting that information is integrated together, causing a juror's perception of guilt (measured

through likelihood ratings) to drift towards a threshold, which then allows a response to be made (Ratcliff & Smith, 2004); thus, the Diffusion Threshold Model of decision making can be applied to a juror decision setting within a three-verdict legal system. However, unlike traditional Diffusion Threshold Models, thresholds may be re-surpassed in a juror setting if a strong piece of evidence is presented post-threshold, as previous research has shown that strong evidence attenuates biases towards information (Ask, Rebelius, & Granhag, 2008; De La Fuente et al., 2003). The last points all varied from each another across the verdicts, this further supports the idea of distinct decision making processes across the three-verdict types. The confirmation of the first hypothesis highlighted that the decision making processes of jurors were distinct across the three-verdict types, thus suggesting that unique thresholds, reached through information integration (Ratcliff & Smith, 2004), allowed jurors to make verdicts.

The significant interaction found (between likelihood points and Verdict Given) also highlighted the unique decision processes behind each of the different verdicts. First, the results showed that in Guilty verdicts, the threshold point was significantly higher than the prior point in relation to likelihood of guilt ratings, thus evidencing that individuals who gave guilty verdicts did so once information integration allowed them to reach a Guilty threshold. This Guilty threshold symbolised the point where jurors believed that the likelihood of the defendant being Guilty was more probable than them being innocent. These results are not dissimilar to the drift process described in previous perceptual decision making research (see Ratcliff & Smith, 2004).

In addition, the results showed that in Guilty verdicts, the threshold point was not-significantly different to that last point in relation to likelihood of guilt ratings; thus, suggesting that once the Guilty threshold had been crossed, defence evidence did not significantly decrease the likelihood of guilt ratings. This may show that information integration decreases once a juror has reached a threshold. Carslon and Russo (2001)

proposed that once a verdict is favoured by a juror that evidence is distorted to support said verdict, which then leads to information integration being attenuated. Thresholds may be the mechanism behind how verdicts are favoured. The Guilty threshold was reached using a frugal number of cues (six pieces of information on average), suggesting that non-compensatory decision making had occurred. The next paragraph will focus on how well the Diffusion Threshold Model described the decision process behind Not Proven verdicts.

The decision making process behind Not Proven verdicts was found to be unique in relation to the other two-verdicts. For instance, in Not Proven verdicts both the prior and last point were significantly lower than the threshold point in relation to likelihood of guilt ratings. This highlighted that the drift of Not Proven verdicts initially rose in a similar fashion to Guilty verdicts, but this drift may have re-surpassed the Guilty threshold through collecting and integrating a number of cues (11.35 on average). Once the Guilty threshold was re-surpassed, the jurors may have reached a decision making zone of 'Not Proven', which is between the Guilty and Not Guilty thresholds. The implication of this is that in complex and difficult cases, where the information may cause the zone of 'Not proven' to be entered, it is likely that a Not Proven verdict may be given as a default (Smithson et al., 2007), thus extra-legal variables (such as the difficulty of the case) may cause an innocent defendant to have a shadow of guilt cast over their innocence. The current research highlighted how the decision process of Not Proven verdicts was unique and different from Not Guilty verdicts, the next paragraph will discuss the decision process behind Not Guilty verdicts.

The decision making process of Not Guilty verdicts was also distinct from the other two-verdicts. The results highlighted that in Not Guilty verdicts, the prior point had a significantly lower likelihood of guilt rating than the threshold point, showing a rise in drift from the prior point to the threshold point. The last likelihood point was also found

to have a significantly lower likelihood of guilt rating than the threshold point, thus highlighting that once the Not Guilty threshold was reached that the evidence was perceived as supporting said threshold (Carlson & Russo, 2001). In addition, on average, Not Guilty verdicts were based on 11.53 pieces of information; providing evidence for compensatory processing in juror decision making.

These findings (above) will now allow the decision process of jurors who gave Not Guilty verdicts to be outlined. First, they may have begun by favouring the defence (slightly), and then they may have increased their likelihood of guilt ratings beyond the 'Not Guilty zone'. However, as cue utilisation increased, they may have become more open (once again) to the idea of the defendant being innocent (Miller, Maskaly, Green, & Peoples, 2011). This may have allowed the drift of said jurors to re-surpass the Not Guilty threshold, after an initial rise, from the Not Proven area into the 'Not Guilty zone'. The Not Guilty threshold point would then symbolise when information integration, over 11.53 pieces on average, allowed the Not Guilty verdict to be favoured over the other verdict types, this links in well with Ratcliff and Smith's (2004) description of the Diffusion Threshold Model.

Jurors who gave Not Guilty verdicts continued to decrease their perception of guilt after crossing the Not Guilty threshold. This may have been because they became more convinced of the defendant's innocence after the Not Guilty threshold had been reached, which suggests that thresholds may promote confirmation bias and pre-decisional distortion (Ask et al., 2008; Carlson & Russo, 2001). Confirmation bias has occurred when an initial decision is made which then influences how the decision maker interprets or searches for future cues (Mehlhorn, Ben-Asher, Dutt, & Gonzalez, 2014); confirming evidence is seen to be positively, neutral evidence is seen to be confirming and disconfirming evidence is disregarded (Nickerson, 1998). Pre-decisional distortion relates to the process of evidence being distorted to support the leading verdict (Carlson

& Russo, 2001). In this view, when jurors reach a Not Guilty threshold, they may then distort the evidence presented to align with this leading verdict (Carlson & Russo, 2001). In summary, the integration of a number of cues may cause the juror to have reasonable doubt, thus allowing the Not Guilty threshold to be crossed, which may then trigger pre-decisional distortion to preserve the Not Guilty verdict as the favoured option (Carlson & Russo, 2001; Miller et al., 2011).

In addition, the fact that cue utilisation differed between the verdict types provides evidence for the Diffusion Threshold Models ability to explain juror decision processes. This is because some verdicts (i.e., Guilty) were reached using fewer cues in comparison to other verdict types (Not Guilty and Not Proven), which suggested that the weight of the information that is integrated and the frugalness of a threshold may determine the verdict that is reached. Guilty verdicts were reached after six pieces of information, even though the smallest vignette in this study still presented 10 pieces of information, which mirrors heuristic processing. Not Proven and Not Guilty verdicts were reached after 11.35 and 11.53 pieces of information respectively, which suggests that these verdicts were reached using more compensatory/ rational decision making processes (Lee & Cummins, 2004). These results taken together provide support to Lee and Cummins (2004) claims that the Diffusion Threshold Model of decision making can mirror both rational and intuitive decision making processes, and the results also propose that said model can be used to explain juror decision processes within a three-verdict system. However, the model may not be good at explaining juror decision processes within the Anglo-American two-verdict system, and the model cannot explain individual differences in relation to why certain thresholds were reached.

A Generalised Estimating Equation was also conducted and this allowed a multinomial logistic regression to be used on a repeated measures design to test if the predictor variables of cue utilisation and threshold point predicted the verdict that was given. This

analysis highlighted that the predictor variables did significantly predict the verdict that was given and that the higher the threshold point was, the more likely it was for participants to give a guilty verdict in comparison to the acquittal verdict options (Not Guilty and Not proven). Further, it was found that the higher participants thresholds were in relation to how many cues they used (i.e., cue utilisation), the more likely they were to give an acquittal verdict option in comparison to a Guilty verdict. The results showed that verdicts are given through likelihood of guilt thresholds being reached which vary in regard to both how much information is needed to reach them and the verdicts they support. These results are supportive of the findings of the ANOVA, and thus indicates reliability and additional depth of understanding to the overall analysis.

The Diffusion Threshold Model of decision making may also tie in with other models of juror decision making, such as the Story Model (Pennington & Hastie, 1981). The Story Model suggests that jurors create narratives throughout a case and this allows them to reach verdicts. Their story is based upon evidence in the trial, pre-existing knowledge and inferences about the trial/crime (Pennington & Hastie, 1981). Stories are chosen if they cover the evidence in the trial and are coherent (Pennington & Hastie, 1981). The verdict chosen is the one that best aligns with the chosen story (Pennington & Hastie, 1981). If the Story Model is adapted to allow a verdict to be favoured as a story is constructed (Carlson & Russo, 2001), then said model would align itself well with the Diffusion Threshold Model of decision making. For instance, information integration may symbolise story generation, the reaching of a threshold may symbolise when a story is chosen, and frugal thresholds may symbolise coherent stories that only needed to use a few pieces of information to generate. Furthermore, the Diffusion Thresholds Model may explain the mechanics behind the Story Model.

The second hypothesis was that there would be significant associations between the ratings of the last piece of information needed (Guilty, Not Guilty and Not Proven) and

the verdicts given (Guilty, Not Guilty and Not Proven). All correlations relating to this hypothesis were found to be significant, thus allowing the hypothesis to be supported.

Despite the significant associations, the results indicated that count information might not be enough to allow thresholds to be reached. Although the significance levels suggested that these results are below a 1% likelihood of occurring by chance, the correlation coefficients are not +/-1.00 (i.e., perfect), which proposes that more than just count information is needed to reach thresholds. The more integrative Diffusion Threshold Model may be a better metaphor for explaining juror decision making processes, as the flexibility of the model can explain the above the results. For example, information rated as Guilty in the current experiment, may have also been perceived as weak, which may have caused drift to decrease, which may have allowed other verdicts/thresholds to be favoured. However, Thomas & Hogue's (1976) Poisson Counter Model suggested that thresholds are reached through evidence weights, thus their adapted model may have explained the responses given in the current study more adequately than the broad Counter Threshold Model tested here; future research, outwith this PhD thesis, aims to test this. In summary, the correlations do hold some support for the Counter Threshold Models ability to describe juror decision processes, but the results also cast doubt on how realistic the model may be in a juror setting; future research should test other Counter Threshold Models within a juror decision environment.

When considered overall, the Diffusion Threshold Model of decision making appears to explain the decision making processes observed in a three-verdict juror setting more adequately than the Counter Threshold Model. The results of the current study suggested that jurors integrate information until distinct thresholds are reached, that varying thresholds allow both rational and intuitive decision processes to be mirrored, and that simple evidence counts do not always allow thresholds to be reached. Furthermore, the current thesis proposes that thresholds are reached in an integrative manner, in line with

the Diffusion Threshold Model, and that each of the verdicts within the Scottish three-verdict system are reached because of said process. The proceeding chapter (Chapter Four) will explore the idea that thresholds may promote confirmation bias in jurors. The next section will discuss the limitations of the current study.

3.4.3. Limitations.

One potential limitation of this study was that there was a lack of ecological validity (Diamond, 1997; Wiener, Krauss, & Lieberman, 2011). The current quasi-experiment was conducted in artificial setting, with a lack of real life cues. This may have made what was observed in the current quasi-experiment different from what may occur in a real life criminal trial (Simon, 1956; Wiener et al., 2011). The length of the vignettes were relatively short in this experiment, with the duration of completing nine vignettes varying from 50 minutes to an hour and a half, which differs from real life jury trials that can take at least a week to complete (Scottish Courts and Tribunal Service, 2015). These unrealistically short juror decision making vignettes may have promoted the heuristic like decision processes observed in guilty verdicts (Diamond, 1997). Nevertheless, constraints in relation to time and participants meant that real life court durations were not feasible.

However, it is unlikely that the lack of ecological validity did significantly influence the decision making processes of participants. This view can be supported by previous research and cognitive invariance. Previous research by Pezdek, Avila-Mora, and Sperry (2010) investigated ecological validity and its effects on culpability by comparing participants who used transcripts versus participants who viewed eyewitnesses on a video camera. It was found that it was the information not the medium that influenced the jurors' belief of culpability surrounding the defendant. This may then suggest that the decision making process observed in the current research may not have been influenced by the

lack of ecological validity (Hastie, Penrod, & Pennington, 1983; MacCoun, 1989). In addition, some cognitive psychologists, who support cognitive invariance, have proposed that cognitive mechanisms, like decision making, happen in the same way regardless of whether they are viewed in a laboratory or in a real life setting (Watt & Quinn, 2008). In summary, it is unlikely that the lack of ecological validity in the current study had a major impact on the decision making processes of participants in this quasi-experiment; but attempts will be made to increase the ecological validity of future studies.

Another confounding variable may be that real life jurors are legally obliged to be in a jury, whereas participants in this research were not. However, because of ethical criteria/considerations the real impact of this cannot, and should not, be tested. Once again, though, cognitive psychologists, that support cognitive invariance, would suggest that this difference in regard to choosing to be a juror should not have an impact on the decision process (Watt & Quinn, 2008). In addition, participants were led to believe that their responses would help legal appeals; this inclusion may have increased the ecological validity of this study to some degree.

A final confounding variable may have been that participants were asked to give likelihood of guilt ratings after each piece of evidence, this may have promoted rational decision making and information integration. Therefore, the results found in the current study may be an artefact of the researcher's design. However, there was no other way to test the Diffusion Threshold Model of decision making, as information integration can only be tested in a juror setting through asking participants to state their perception of guilt surrounding the defendant after each piece of evidence (see Estrada-Reynolds et al., 2015), thus the current design was deemed necessary. The next section will discuss future lines of enquiry.

3.4.4. Future research.

Both Guilty and Not Guilty thresholds seemed to promote confirmation bias and evidence distortion; therefore, future research should investigate this further. Further, in Guilty verdicts, the threshold point did not differ significantly from the last point in relation to likelihood of guilt ratings; and, in Not Guilty verdicts, the last point had a significantly lower likelihood of guilt rating in comparison to the threshold point. These two findings taken together may provide support for thresholds promoting confirmation bias and evidence distortion.

The current study provided support for thresholds being reached through information integration. An alternative explanation, however, may relate to evidence distortion/confirmation bias. Pre-trial biases, not observed in the current study, may have caused evidence distortion (Estrada-Reynolds et al., 2015), thus causing some thresholds/verdicts to be favoured. In other words, thresholds may have been reached through pre-trial biases and evidence distortion.

In addition, as previously mentioned, the current study does not highlight whether the Diffusion Threshold Model of decision making can explain juror decision making within a two-verdict system. Therefore, future research is needed for three reasons: 1) to test whether information integration allows thresholds to be reached; 2) to investigate whether thresholds promote confirmation bias/evidence distortion; and, 3) can the Diffusion Threshold Model explain juror decision making within a two-verdict system.

3.5. Conclusion

This study has shown that the Diffusion Threshold Model may be the best metaphor to explain juror decision making processes within the Scottish three-verdict system, as the less flexible Counter Threshold Model could not explain why all the thresholds were

reached. The current research highlighted that jurors in a three-verdict system reached verdicts through distinct thresholds and information integration. Future research should investigate if thresholds associated with the Diffusion Threshold Model promote confirmation bias, and this line of enquiry will be followed up in the next chapter. Furthermore, the Diffusion Threshold Model gives a good explanation of juror decision making within a three-verdict system.

4. Chapter Four: Faith in thy Threshold

4.1. Introduction

The findings from Chapter Three highlighted that the Diffusion Threshold Model described juror decision making processes more adequately than the Counter Threshold Model, and that verdicts were given once specific thresholds had been reached (i.e., Guilty and Not Guilty). Not Proven verdicts were given as a default option if the decision maker's belief of guilt fell in between the Guilty and Not Guilty thresholds. Further, the decision making processes identified in the previous chapter indicated that the last threshold reached affects the way in which jurors interpret incoming novel information. The previous study, however, was not designed to investigate the influence that thresholds may have on evidence interpretation, and, as such, these findings are only indicative, the current chapter will test the influence of thresholds on information interpretation directly. The current chapter will start with a discussion on relevant literature surrounding topics such as confirmation bias and information integration, this will be presented to provide adequate context for the reader, and will then progress to a quasi-experimental investigation of the main aim. The main aim of the current chapter is to investigate whether or not thresholds promote evidence distortion in jurors when they are deciding on a verdict.

The distortion of evidence by jurors could have a disastrous impact on both individuals and society. Evidence distortion can be brought about by a specific cognitive bias called confirmation bias (Nickerson, 1998). Confirmation bias relates to individuals perceiving evidence that confirms a belief positively and disconfirming evidence negatively (Nickerson, 1998). Confirmation bias has been cited as having a negative influence in the courtroom (Cargill, 2016; Larosa, 2014). For example, David Camm, an American state trooper, was convicted twice for murdering his wife and children. After 13 years in prison,

he was finally released after an appeal found that the evidence from the prosecution in the previous two trials should have been excluded (Cargill, 2016; Larosa, 2014). It has been suggested that confirmation bias caused the innocent David Camm to be falsely imprisoned (Cargill, 2016; Larosa, 2014). The reasoning behind confirmation bias being charged for David Camm's injustice is because Camm's charges were not dropped despite the prosecution's evidence being found to be unreliable/inaccurate (Cargill, 2016). His charges remained, and a trial commenced based on the beliefs of the prosecutors rather than the facts.

It is therefore evident that injustice may be an outcome of a distorted decision making process, and this may be caused by confirmation bias (Findley & Scott, 2006; McFarlane & Cordner, 2008). Confirmation bias prevents jurors, police officers, lawyers, and judges from using all of the available evidence within a case, thus increasing the chances of an error occurring (Findley & Scott, 2006; Jonas, Schulz-Hardt, Frey, & Thelen, 2001). Injustices, such as described earlier, have a number of significant and negative impacts on the legal system. First, an innocent individual has been failed in being given their right to a fair defence. Second, a victim has been failed in their right to justice and retribution. Third, a Guilty perpetrator is still free to recidivate. Finally, the criminal justice system is failing in their obligation to society of deterring potential criminals, rehabilitating offenders, and incarcerating offenders (Burke, 2006). Confirmation bias undermines justice and the aims of the legal system, and research therefore needs to be conducted to investigate such a negative phenomenon from within a juror context.

4.1.1. Background literature review.

The following section will discuss in detail the relevant theories and constructs regarding evidence distortion. This review will start with a discussion on confirmation bias and the

mechanisms behind said bias. Then, this review will progress to presenting previous literature on information integration. After this, this section will discuss how both information integration and confirmation bias can be explained by the Diffusion Threshold Model of decision making. Finally, this section will end by outlining the current study.

4.1.1.1.   *Confirmation bias.*

Confirmation bias occurs when a decision maker searches for information or interprets information in a way that supports their initial hypotheses, predictions, and attitudes (Findley & Scott, 2006; Nickerson, 1998). This bias can skew information search in naturalistic decision making tasks where the decision maker can choose which pieces of information they want to use (Nickerson, 1998).

Some confirmation bias studies have been based on a relatively simple selection task that was developed by was Wason (1968). Typical experiments using this selection task method present four double-sided cards to participants (Jones & Sugden, 2001). Participants are informed that on the cards there is a number on one side and a letter on the other side. Only one side of the cards is shown to participants, these cards present the letters A and D, and the numbers 4 and 7. The participants are told that if the card shows a vowel, then an even number would be on the other side of the card. The participants are then asked to test this rule by rotating any card they like, the two most common actions are to choose the A card on its own or to choose A and 4 together (Jones & Sugden, 2001), these choices are *confirming*. Therefore, it can be assumed that the participants in this study were trying to confirm the rule given to them. However, if the participant had wanted to *disconfirm* the rule, they would have picked cards A and card 7 (Jones & Sugden, 2001). This is because card 7 may have had a vowel on the other side, which

would have showed the rule to be incorrect (Jones & Sugden, 2001). Consequently, confirmation bias may exist in simple decision making tasks.

However, the legal system has a much more complex nature than the selection task experiment described previously. A number of complex pieces of information can be presented to jurors, which can contradict one another and come from different sources. There is no clear rule of decision making to be confirmed in a juror decision making context; rather the evidence from a case may be used by jurors to confirm their leading verdict (Carlson & Russo, 2001). In addition, evidence from a court case is presented in a sequential manner (in comparison to the holistically presented selection task created by Wason, 1968), and information search is controlled by both the judges and the prosecution and defence lawyers. Despite the complexity of the juror decision making task, this does not mean that confirmation bias will not occur. Indeed, confirmation bias has been found to be stronger when a sequential search pattern is presented (Jonas et al., 2001).

Confirmation bias may cause jurors to perceive information that supports their initial decision/threshold and/or belief more positively than pieces of evidence that contradicts their view (Nickerson, 1998). A related construct to confirmation bias, pre-decisional distortion may also occur in the courtroom. This is where information is skewed to favour prior biases (Estrada-Reynolds et al., 2015), thereby strengthening the effects of confirmation bias. Confirmation bias may also be exaggerated in jurors as it has been found that the outcome that is favoured does not distort pre-decisional search, but does distort pre-decisional evidence evaluation (Chaxel, Russo, & Kerimi, 2013). For example, if a juror believes that a defendant is Guilty, then any information that supports their view will be interpreted as strong evidence, and information that does not fit in with the juror's hypothesis will be viewed as unreliable. Confirmation bias, therefore, allows cue/evidence interpretation to be affected by pre-conceptions and the current hypothesis of the decision maker (Carlson & Russo, 2001).

One piece of research from Estrada-Reynolds et al. (2015) found that prior beliefs (pro-prosecution, pro-defence and neutral) could forecast the final sentence recommendations given by jurors. This highlights that novel evidence is distorted so that it is more in line with the leading verdict. In addition, Carlson and Russo (2001) found that mock jurors distorted information from a civil trial, and that the prior beliefs of the juror (either pro-plaintiffs or pro-defendants) influenced the verdicts they finally gave. Interestingly, confidence increased with distortion, thus highlighting that evidence distortion and confirmation bias allowed jurors to believe that their leading verdicts were the most appropriate verdicts to give (Carlson & Russo, 2001). Furthermore, confirmation bias and evidence distortion may occur when jurors are making decisions.

One mechanism through which confirmation bias is thought to occur is through belief persistence; that is, a continued belief despite the presence of contradictory evidence (Findley & Scott, 2006). Belief persistence is thought to influence evidence evaluations, thus making it difficult for a belief to be changed once it has been established (Findley & Scott, 2006). For instance, once a conclusion (or threshold) has been reached by a decision maker, disconfirming evidence will either be discredited or be viewed critically, and ambiguous evidence may be interpreted in a way that supports the decision maker's initial conclusions (Findley & Scott, 2006).

Another potential explanation for confirmation bias relates to cognitive dissonance (Jonas et al., 2001). Cognitive dissonance occurs when the beliefs that a decision maker has and the information (i.e., the new competing belief system) that is being supplied to the decision maker contradict one another (Jonas et al., 2001). This variance between the original belief and the novel information may cause psychological and physiological discomfort (Elliot & Devine, 1994). To reduce this discomfort, the decision maker may try to reduce the cognitive dissonance (Jonas et al., 2001). The most common and 'cognitively easy' way to do this is to stop searching for disconfirming information, and

to focus information search on confirming evidence (Jonas et al., 2001). However, this would not be possible within a courtroom. Instead, jurors may seek to reduce their dissonance through viewing confirming evidence more positively than disconfirming evidence. Similarly, they may attend more to confirming evidence when making a decision and when within the deliberation room (Pritchard & Keenan, 2002).

While this example would appear as a logical strategy to reduce cognitive dissonance and increase consonance, thereby reducing psychological discomfort through the simplest mechanism available, research by Ask and Granhag (2005) provided weak evidence for the effects that cognitive dissonance has on confirmation bias. In their experiments, police officers and undergraduate students read information relating to a murder case. The participants were categorised into one of two conditions: in one condition, the prime suspect was given a motive, and in the second condition, a second suspect was mentioned. This manipulated the participants' initial hypotheses as to who they thought committed the homicide.

Participants were also given a need for closure inventory to measure the decision maker's desire for a chosen outcome that lacks ambiguity (Ask & Granhag, 2005). Need for closure acted as a moderator between the conditions, as individuals high in need for closure were more likely to participate in confirmation bias in the motive condition, and were less likely to be biased in regard to confirming evidence when an alternative suspect was given. This may show that when individuals are given a primary hypothesis, cognitive dissonance may form from the presentation of disconfirming evidence that opposes the primary hypothesis, thus allowing confirmation bias to occur in order to reduce said dissonance. The introduction of an alternative hypothesis may help to attenuate confirmation bias, as no primary hypotheses can be set and consequently cognitive dissonance cannot arise. However, these results were not found within the

student sample. Further research is needed to extend the effects that cognitive dissonance may have on confirmation bias (Ask & Granhag, 2005) within a legal setting.

Confirmation bias is important in decisions were accuracy is not the sole focus (Mercier & Sperber, 2011; Nickerson, 1998), as is the case in legal judgments, where decisions are necessarily made under conditions of uncertainty. Confirmation bias is a natural tendency for decision makers to spend cognitive efforts finding evidence that supports their initial views in order to appear correct (Mercier & Sperber, 2011; Nickerson, 1998). It could be argued that confirmation bias is a cognitive trait that has been passed on through evolutionary processes, as it has an adaptive advantage in social situations (Mercier & Sperber, 2011; Nickerson, 1998). This adaptive advantage of appearing correct may increase the decision maker's social standing within a group (Mercier & Sperber, 2011; Toma, Gilles, & Butera, 2013).

The description just discussed fits well within a juror/jury environment. Jurors are in a forced group dynamic where there may not be a definitive answer, this may then lead jurors to value appearing correct more than actually being correct, which may be one motivation behind confirmation bias (Nickerson, 1998). Other motivations have also been found to fuel biases and fallacies (Toma et al., 2013). For instance, research by Toma et al. (2013) used a design that caused participants to think that they were working in a team on an issue that centred on who was Guilty in an accident involving a car; participants were either placed in a competitive or cooperative group environment. In a competitive environment, over a cooperative environment, confirmation bias was more likely to be present (Toma et al., 2013). This research highlighted that the mere presence of competition brought about confirmation bias. One reason for this may be because, as previously mentioned, confirmation bias may save a decision maker from appearing wrong in a competitive environment (Toma et al., 2013), which may be important to an individual as it may enhance their self-worth and dominance within a group (Toma et al.,

2013). Therefore, confirmation bias may play a social function (Mercier & Sperber, 2011) in addition to its cognitive function.

In summary, confirmation bias and evidence distortion may influence how jurors evaluate evidence in a courtroom. The current section has discussed previous decision science and juror decision making investigations relating to confirmation bias, alongside cognitive and social functions for why confirmation bias occurs. The next section will examine information integration.

4.1.1.2.   *Information integration.*

Some research has found, however, that disconfirming evidence is used when jurors are making decisions (Estrada-Reynolds et al., 2015). Estrada-Reynolds et al. (2015) aimed to test whether or not death sentence recommendations were distorted throughout a capital punishment case in accordance with pre-trial biases (pro-prosecution, pro-defence or neutral); they did this by asking participants to give sentence recommendations (one = more likely to sentence life; and seven = more likely to sentence death) at eight separate points in time. Estrada-Reynolds et al. (2015) found that that sentence recommendations were changed in the appropriate direction, sentence recommendations increased with prosecution evidence and decreased with defence evidence. This does suggest that jurors may integrate information throughout a trial.

There are problems with the design of the research conducted by Estrada-Reynolds et al. (2015). For instance, distortion would probably have been more evident if the weight/strength of the evidence, in comparison to sentence recommendations, had been measured (Cheikes, Brown, Lehner, & Adelman, 2004; Estrada-Reynolds et al., 2015; Nickerson, 1998). The prior claim is supported by previous research, as confirmation bias has been shown to influence the interpreted weight, and evaluation, of evidence (Chaxel

et al., 2013; Nickerson, 1998). Previous research has not investigated the impact that confirmation bias may have on the perception of guilt, however. In addition, pre-trial biases still forecasted the final verdict in the study by Estrada-Reynolds et al. (2015), thus showing that evidence distortion may still play a role in juror decision making. Nevertheless, Estrada-Reynolds et al. (2015) have suggested that their results provide support for the information integration theory.

Information integration theory proposes that juror interpretations of the information presented in the courtroom can be described by a weighted average of a pre-trial belief alongside the probability of guilt inferred by every piece of evidence (Kaplan & Miller, 1978; MacCoun, 1989; Pennington & Hastie, 1983). In this theory, belief of guilt is adjusted after each piece of information (MacCoun, 1989), jurors do not ignore disconfirming evidence (Estrada-Reynolds et al., 2015), and through evaluating and integrating evidence a juror is able to make a decision (Shanteau & Nagy, 1984). Ostrom et al. (1978) found that jurors start with an innocent-until-proven-guilty belief and that said belief is integrated with trial evidence to produce the final verdict. Kaplan and Kemmerick (1974) found that both legal and extra-legal (e.g., gender of the defendant) pieces of information allow a unitary evaluation of which verdict is most appropriate. In addition, Kaplan and Miller (1978) found evidence for the information integration theory through showing that the influence that pre-trial biases have could be reduced by increasing the reliability of the information presented in court, thus highlighting that a weighted averaging of prior beliefs and the perception of guilt gained from the evidence had occurred. Therefore, a number of pieces of previous research have highlighted that jurors may integrate the information presented to them in a trial.

In summary, previous research from Estrada-Reynolds et al. (2015) and Kaplan and Miller (1978) suggested that disconfirming evidence is still evaluated in juror judgments. However, Estrada-Reynolds et al. (2015) also found that evidence distortion might play

a role in juror decision making. The next section will discuss how threshold models of decision making (investigated in previous chapter) may be able to explain both information integration and confirmation bias.

4.1.1.3.   Thresholds, information integration and confirmation bias.

In contrast to confirmation bias, the information integration theory would suggest that jurors do not ignore or distort information and that information integration occurs, which then influences the decision (Estrada-Reynolds et al., 2015). Previous research has found support for both confirmation bias/evidence distortion and information integration occurring in jurors (Carlson & Russo, 2001; Estrada-Reynolds et al., 2015); therefore, a model of decision making that could explain both of these respective information evaluation methods would hold great utility.

Chapter Three highlighted that the decision making of jurors could be explained using a unified Diffusion Threshold Model of decision making. This model allows both rational and intuitive processes to be encompassed by having a varying threshold; high thresholds are equivalent to rational processing, while low thresholds are equivalent to frugal processing (Lee & Cummins, 2004). In the Diffusion Threshold Model, the decision maker reaches their relative threshold through information integration (Ratcliff & Smith, 2004). Therefore, the information integration theory fits well with the Diffusion Threshold Model in that both suggest that information integration allow a decision to be made.

In addition, previous research that supports the information integration theory within juror decision making, such as Kaplan and Miller (1978), also supports the Diffusion Threshold Models use of information integration to explain how thresholds are reached. The information integration theory also corresponds well to the findings presented in Chapter

Three, as the average likelihood ratings, from the three points measured (prior, threshold and last point), were significantly different between the verdicts, which indicated that the way information was integrated did have an impact on which decision was reached.

However, the Diffusion Threshold Model discussed and tested in the previous chapter differs from the information integration theory in one important way. In the information integration theory, a decision cannot be made until all of information has been integrated (Estrada-Reynolds et al., 2015), whereas in the Diffusion Threshold Model, information integration may only occur until a threshold has been reached (Ratcliff & Smith, 2004); this difference is more apparent within a juror context than it is within everyday decision making. In everyday decision making environments, the Diffusion Threshold Model would propose that individuals integrate available information until a threshold is reached, which would stop information search, and an outcome would then be chosen (Ratcliff & Smith, 2004). Juror decision making differs from everyday decision making though, as jurors do not control when information search/presentation is halted, lawyers and judges have control over the quantity of information shown in court.

Simon (1956) suggested that when making decisions our cognition and environment interact. Consequently, jurors may still integrate information until a threshold has been reached; however, the environmental control over information search/presentation may have an impact on what occurs post-threshold. This difference in regard to what occurs once a threshold has been reached may explain why jurors have been found to be anxious about their decision making (Bornstein, Miller, Nemeth, Page, & Musil, 2005), as decision making that occurs every day may not be challenged post-threshold, whereas juror decision making may be. Decision makers in non-legal environments are not forced fed information (both confirming and disconfirming) once a threshold is reached, meaning that anxiety and regret does not have the chance to arise. Conversely, jurors may be provided with information post-threshold, which then allows disconfirming evidence

to challenge the current threshold, meaning that anxiety or cognitive dissonance may occur (Jonas et al., 2001)

The above paragraph raises an important question, what happens to the evidence presented once the last threshold has been reached? Previous research would propose that confirmation bias and evidence distortion might occur. There are a number of reasons for this. First, the reaching of a threshold may create a hypothesis in the juror (e.g., "the defendant is guilty"), which may promote belief persistence and cause beliefs to remain despite the presence of disconfirming evidence (Findley & Scott, 2006). Second, the belief associated with the threshold may be challenged by disconfirming evidence, thus stimulating cognitive dissonance (Jonas et al., 2001), which may lead to confirmation bias and evidence distortion to decrease said dissonance. Finally, Carlson and Russo (2001) found evidence of pre-decisional distortion in jurors, as they found that juror interpretations of new pieces of evidence were biased in order to support leading verdicts. Thresholds and leading verdicts are equivalent, as both represent tentative verdicts that are favoured by a juror during a trial (Carlson & Russo, 2001), which suggests that thresholds may also promote evidence distortion. Furthermore, it seems likely that after a threshold is crossed, information may be distorted to support the verdict that corresponds to a particular threshold.

The Diffusion Threshold Model may therefore have two stages within a juror context: 1) an information integration stage that allows a threshold to be reached, and 2) an information distortion stage that allows the threshold to be supported. The first stage of this model is based upon traditional Diffusion Threshold Models, where thresholds are reached through information integration (Ratcliff & Smith, 2004); the second stage is based upon Carlson and Russo's (2001) research, where leading verdicts were shown to cause evidence distortion. These two stages may make the Diffusion Threshold Model a more realistic and global model within a juror decision making context, as both

information integration and evidence distortion has been found in previous juror decision making research (Estrada-Reynolds et al., 2015; Nickerson, 1998). In summary, both information integration and evidence distortion may be encompassed within the Diffusion Threshold Model of decision making when it is applied to a juror context.

4.1.2. Current study

Two main areas of research were discussed in the current literature review: 1) confirmation bias/evidence distortion; and 2) information integration. Both information integration and confirmation bias have been shown to exist within a juror decision making setting. Ostrom et al. (1978) found that prior beliefs and evaluations of trial evidence are averaged together to allow a verdict to be reached, whereas Carlson and Russo (2001) found that leading verdicts bias jurors' evaluations of novel evidence. Estrada-Reynolds et al. (2015) conducted a study that provided mixed results: pre-trial biases predicted final sentence recommendations (supporting confirmation bias), and prosecution evidence increased sentence recommendations and defence evidence decreased sentence recommendations (supporting information integration). However, Estrada-Reynolds et al.'s (2015) study investigated information integration and confirmation bias in a death penalty trial, which has limited generalisability to a UK court setting. Research is therefore needed to address how jurors process evidence (integration vs. distortion) in trials (e.g., homicide trials) that can occur in the UK.

The Diffusion Threshold Model, discussed in Chapter Three, may be able to explain Estrada-Reynolds et al.'s (2015) mixed results. Jurors may integrate information until they reach a threshold (Ratcliff & Smith, 2004); this threshold may then act as a leading verdict, thus promoting pre-decisional distortion (Carlson & Russo, 2001). The current study, therefore, has two main questions to test: '1) does information integration allow

thresholds to be reached?' and '2) does the reaching of a threshold promote evidence distortion?'.

In order to address these questions, participants were presented with four pieces of evidence and one closing statement from each of the stances (i.e., prosecution and defence), participants were also asked to give a final verdict (Guilty or Not Guilty) once all the evidence had been presented. In addition, participants stated their threshold by telling the researcher what the last piece of evidence they needed was, responses given both at and before this piece of evidence were categorised in the pre-threshold condition, and responses given after this point were categorised in the post-threshold condition. Further, the study was designed to investigate if evidence type (prosecution and defence), threshold (pre- and post) and the Verdict Given (Guilty and Not Guilty) significantly interacted across the likelihood of guilt ratings. If evidence distortion is promoted through a threshold being reached and if thresholds are reached through information integration, it is expected that in Guilty verdicts that the likelihood of guilt ratings generated from prosecution evidence and defence evidence will be higher post-threshold in comparison to pre-threshold; and, that in Not Guilty verdicts, the likelihood of guilt ratings generated from prosecution evidence and defence evidence will be lower post-threshold in comparison to pre-threshold.

In addition, if confirmation bias/evidence distortion is promoted by thresholds being reached, then the post-threshold condition should generate higher likelihood of guilt ratings in Guilty verdicts in comparison to Not Guilty verdicts, regardless of evidence type. It is believed that the current study will find that confirmation bias/evidence distortion is promoted through thresholds being reached, as Carlson and Russo (2001) found that evidence distortion in jurors was promoted by a verdict being favoured. Further, if thresholds are reached through information integration, the pre-threshold condition should generate higher likelihood of guilt ratings when prosecution evidence

has been presented in comparison to when defence evidence has been shown, regardless of the Verdict Given . It is expected that information integration will allow thresholds to be reached as Ratcliff and Smith (2004) suggested that thresholds are reached through information integration.

The current research is novel, and is the first research investigation to study how threshold mechanisms may promote evidence distortion. The current study also has practical implications. For instance, if thresholds do promote confirmation bias and evidence distortion, then thresholds are impeding on the fairness of the legal system (Ramsey, & Frank, 2007; Runciman, 1993), which highlights that courts should try to decrease the frugalness of decision thresholds.

The last chapter found that the Diffusion Threshold Model does have applications within a Scottish three-verdict system, but its applications within the Anglo-American two-verdict system is still unknown. Therefore, the current study also aimed to test if the Diffusion Threshold Model has applications within a two-verdict juror system. This aim was studied using the same likelihood points (prior, threshold and last) described in the previous chapter. However, because of the Anglo-American context of the current study, jurors could only give Guilty and Not Guilty verdicts.

To test if the Diffusion Threshold Model can be applied to a two-verdict juror setting, the following hypothesis was created:

1. There will be a significant interaction between Verdict Given and likelihood points in relation to likelihood of guilt ratings.

The hypothesis is testing whether or not information integration allows distinct thresholds to be reached. If information integration does allow thresholds to be reached, it is expected that likelihood of guilt ratings will differ significantly between the prior point and the threshold point across each of the verdict types (Guilty, Not Guilty and Not Proven). In addition, if distinct thresholds do allow verdicts to be given, it is expected that the threshold points will be found to be distinct across the verdicts in relation to likelihood of guilt ratings. If these expected results are found, then the hypothesis can be supported, which will provide evidence for the Diffusion Threshold Models ability to describe juror decision processes within a two-verdict system. It is expected that this hypothesis will be supported as Ratcliff and Smith (2004) suggested that decisions are made through information integration allowing distinct threshold to be reached.

4.2. Method

4.2.1. Design.

Two designs were incorporated into this quasi-experiment. The first design in this quasi-experiment used a 2 x 3 x 2 mixed design (see section '4.2.1.1. Information integration versus evidence distortion') to test the following questions: '1) does information integration allow thresholds to be reached?' and, '2) does the reaching of a threshold promote evidence distortion?'. The second design used a 3 x 2 mixed design (see section '4.2.1.2. Diffusion Threshold Model in a two-verdict setting') to test whether or not the Diffusion threshold Model can describe juror decision processes within a two-verdict system.

4.2.1.1. *Information integration versus evidence distortion.*

This quasi-experimental design adopted a 2 x 3 x 2 mixed design, where threshold (pre- and post-threshold) and evidence type (prior (before any evidence was shown), prosecution and defence) were altered within-subjects factors, and Verdict Given (Guilty vs. Not Guilty) was a between-subjects factor. The DV here was the likelihood of guilt ratings, which have been used to investigate information integration in previous studies (Kaplan & Miller, 1978).

4.2.1.2. *Diffusion Threshold Model within a two-verdict setting.*

Within the same quasi-experiment, the Diffusion Threshold Models ability to describe juror decision processes within a two-verdict system was tested. For this analysis, a 3 x 2 mixed design was adopted, the within-subjects variable of likelihood points (prior, threshold and last) and the between-subjects variable of Verdict Given (guilty and Not Guilty) were used; these variables were created in the same way as the previous chapter. The DV here was the likelihood of guilt ratings. An additional DV named cue utilisation (i.e., how many cues were used) was used to test the efficacy of the Diffusion Threshold Model within the two-verdict system, this measure was created in the same way as described in Chapter Three.

In addition, supplementary analysis tested whether the Verdict Given variable (Guilty and Not Guilty) could be predicted using two predictor variables: 1) cue utilisation; and, 2) threshold point. Here the Verdict Given variable was used as a criterion variable. This analysis was conducted to confirm whether or not thresholds allow verdicts to be reached.

4.2.2. Participants.

One hundred and eight participants took part (12 people per vignette over nine vignettes; 73 female). The age range was 18–57 years, and the mean age was 26.1 ($SD = 8.32$) years old. Sixty-nine of the participants identified as students, the sample also consisted of other occupations, including but not limited to: academics, semi-skilled workers and the unemployed. Exclusion criteria included: people who were not on the electoral role; people who were not native to the UK; and those who did not have a visa. This was to ensure that the participants in this study were as close to a real life British jury population as possible. Opportunistic sampling was used, which included participants being recruited from websites (e.g., Gumtree, Call for Participants, and Craigslist, Facebook and Twitter).

4.2.3. Materials.

4.2.3.1. Vignettes.

Nine vignettes were used in the current study and participants heard one of these vignettes each. This increased the generalisability of the current study as each vignette varied in relation to the evidence, the defendant and the victim. In addition, by reducing the number of vignettes each participant was presented with, it countered a criticism of the last quasi-experiment, as it was reported by the previous studies participants that too many vignettes were shown.

4.2.3.1.1. Vignette construction.

Nine separate vignettes were developed through consulting literature on vignette development (i.e., Ashill & Yavas, 2006; Heverly et al., 1984). The vignettes were developed to be short (eight pieces of information and two closing statements) and representative of court trials (Miles & Huberman, 1994). The vignettes in the current

study were fictitious, but the structure and the evidence used in the vignettes were representative of previous court trials. This was ensured through the researcher consulting newspaper materials, court transcripts and visiting the High Court in Edinburgh. In addition, the vignettes were designed to be consistent, as all the victims were female, all the defendants were male, and all of the charges were homicide, which should prevent confounding variables, such as crime type and gender bias, from having a negative impact on the study.

The type of information presented, and the order of the information was kept constant throughout the vignettes, this was conducted in order to ensure that the vignettes were relatively similar. For example, participants first heard an opening statement from a judge, which provided contextual information, such as the name of the victim and the defendant. The first piece of evidence that participants were given was eyewitness testimony from the prosecution, which was then followed by a rebuttal from the defence. Participants then heard special witness testimony that supported the prosecution. This was followed by the defence's attempt to discredit the special witness's evidence in order to create reasonable doubt. The participants were then provided with a secondary confession (i.e., motive), which was discredited by the defence in the following piece of evidence. After this, the prosecution provided participants with information that highlighted that the defendant lacked an alibi. The defence rebutted this with a possible alibi, usually placing the whereabouts of the defendant in a location different from the victim. Finally, participants heard a closing statement from the prosecution, which was followed by a closing statement from the defence. The pieces of evidence, mentioned above, were selected as they had been used in previous forensic decision making experiments and are used in homicide trials (Ask et al., 2008; Lemieux, 2007; Wetmore, Neuschatz, & Gronlund, 2014).

Vignettes were designed to be of similar lengths in order for attentional biases to be reduced. The average word length of the vignettes was 704.11 (minimum = 606; maximum = 773; SD = 57.57).

The structure (i.e., prosecution evidence followed by defence evidence) of the vignettes were designed in a way to allow them to be ambiguous. This was conducted for two reasons. First, because court trials are inherently ambiguous, therefore juror vignettes should be equally ambiguous; if they were not, then the case would either not reach court or a settlement would be reached (Arkes, & Mellers, 2002; De La Fuente et al., 2003). Second, because ambiguity breeds bias, consequently ambiguous vignettes are the best way to investigate decision making biases (Dror, 2016). In addition, the structure was chosen for ecological validity purposes, as prosecution evidence is followed by defence evidence in real life court trials. Finally, these vignettes were designed by the researcher, and were proof read by their supervisors to ensure face validity.

4.2.3.2.   *Audio recording device.*

The vignettes were recorded in order to make the experiment more ecologically valid, as real jurors would listen to listen to the evidence presented in court. Therefore, in the current study, participants listened to the vignettes and did not read them. The vignettes were recorded with a voice actor in a quiet room at Edinburgh Napier University. The researcher used the audio recording app *Dictaphone – Audio Recorder* on an *iPhone 5* to record the vignettes. The audio recording was then edited on a program named *Audacity*. The average length of the audio vignettes was four minutes 16 seconds (minimum =3.48; maximum = 4.50; *SD* = .38).

4.2.3.3. Audio playback device.

The audio vignettes were saved as an mp3 file, and played out of *Windows Media Player.* The participants heard the vignettes from *Labtec Spin 95* speakers.

4.2.3.4. Verdict judgments.

Once participants had heard all the evidence available, they were asked to give a final verdict. Only two-verdict options were available here, participants could only give a Guilty or a Not Guilty verdict, thus creating the between-subjects factor of Verdict Given

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4.2.3.5. Threshold.

Participants were asked to state the last piece of information they needed to make a decision, this piece of information was marked as their threshold. Any responses (i.e., likelihood of guilt ratings) given both at and before this point were categorised in the pre-threshold condition, and any responses given after this point were marked within the post-threshold condition, thus allowing the within-subjects factor of threshold to be created.

4.2.3.6. Likelihood rating scale and cue utilisation.

Likelihood of guilty ratings varied between 0-100, with higher ratings suggesting a higher perception of guilt surrounding the defendant. Previous researchers, such Kaplan and Miller (1978), have used likelihood of guilt ratings to measure information integration in jurors. Participants were asked to state a likelihood of guilt rating after the prior point, after each piece of evidence, and after each of the closing statements. In addition, cue utilisation was measured by asking participants to state the last piece of evidence they needed to reach their verdict, all the information up until this point was used within the cue utilisation measure. Cue utilisation had the potential to vary in the current study from one cue to 10 cues (eight pieces of evidence and two closing statements).

4.2.3.7.   *Demographics questionnaire.*

The demographics questionnaire asked participants to state their: 1) age, 2) gender, and, 3) occupation.

4.2.3.8.   *Information sheet, consent form and debrief.*

All participants received a standardised information sheet and consent form prior to participation in this study, and a debriefing sheet at the end. These materials made participants aware of exclusion/ inclusion criteria, ethical issues (such as the right to withdraw and confidentiality), and who to contact if they have an issue.

4.2.4. Procedure.

Participants read the standardised information sheet and completed the consent form within a laboratory room in the Psychology Laboratory at Edinburgh Napier University. Once the consent form was signed, participants filled out the demographics questionnaire. The researcher then played the recording of the opening statement to participants. The participants were then asked to state a prior likelihood of guilt rating (i.e., a likelihood of guilt rating given before any evidence has been provided); this was recorded by the researcher. Participants then heard the first piece of evidence, which was always a piece of eyewitness testimony supporting the prosecution, and were asked to state another likelihood of guilt rating, which was also recorded by the participant. This basic procedure was then repeated for the remaining seven pieces of evidence (three for the prosecution and four for the defence).

Once all of the evidence had been presented, participants were played closing statements from both the prosecution (first) and the defence. These closing statements were also rated in relation to likelihood of guilt ratings. After the closing statements, participants were

asked to give a verdict: Guilty or Not Guilty. Then, participants were asked to identify the last piece of evidence that they needed to make their decision (i.e., they state their threshold). Once the participants had finished, they were given a debrief sheet and were asked to confirm that they were happy for their data to be analysed by ticking a box; no participants chose this withdrawal option. The task took on average 20 minutes to complete.

4.2.5. Ethics.

The current study was granted ethical approval by the Research Integrity Committee in the School of Applied Sciences at Edinburgh Napier University.

4.3. Results for the Second Quasi-Experiment

This section will present an exploration of juror decision making within a two-verdict system. First, descriptive statistics will be presented for each of the key analyses. Second, inferential statistics will be discussed. The inferential statistics section will begin with the Diffusion Threshold Models ability to describe juror decision processes within a two-verdict system being tested. This section will then progress to outlining the differences found in cue utilisation across the different verdicts given. The results section will finish with a Generalised Estimating Equation (GEE), which investigated both the influence that thresholds have on confirmation bias/evidence distortion and whether or not thresholds are reached through information integration.

4.3.1. Descriptive statistics for the Diffusion Threshold Model within a two-verdict system.

The data were found to be normally distributed, which allowed inferential statistics to be conducted (Laerd Statistics, 2017). The descriptive statistics highlighted that in Guilty verdicts the prior point had a lower likelihood of guilt rating in comparison to both the threshold and last point, and that the last point had a lower likelihood of guilt rating than the threshold point. In Not Guilty verdicts, it was found that both the prior and last point had a lower likelihood of guilt rating in comparison to the threshold point. Table 6 presents the descriptive statistics for each of the three points (prior point, threshold point, and last point) across both of the verdict types.

Table 6

Descriptive statistics for the likelihood points across the verdicts given in the two-verdict system

	Likelihood Points		
Verdict type	Prior	Threshold	Last
Guilty:			
Mean	41.67	80.93	74.43
Standard Deviation	23.68	14.68	16.05
Not Guilty:			
Mean	28.04	45.41	41.37
Standard Deviation	25.69	21.28	22.96

4.3.2. Descriptive statistics for cue utilisation within a two-verdict system.

It was found that the cue utilisation (i.e., how many pieces of evidence were used) data was normally distributed; this allowed inferential statistics to be conducted (Laerd Statistics, 2017). The descriptive statistics showed that more cues were used for Not Guilty verdicts in comparison to Guilty verdicts. Table 7 presents the cue utilisation for each of the verdict types.

Table 7

Descriptive statistics for cue utilisation across the different verdicts given in the two-verdict system.

Verdict Given	Cue Utilisation
Guilty:	
Mean	3.67
Standard Deviation	1.85
Not Guilty:	
Mean	7.60
Standard Deviation	2.20

4.3.3. Testing the efficacy of the Diffusion Threshold Model in a two-verdict system using Binary Logistic Regression.

In relation to the predictor variables, no outliers were found, meaning that a binary logistic regression could be conducted. It was also found that more Not Guilty verdicts were given in comparison to Guilty verdicts. Please see Table 8 for more information.

Table 8

Descriptive statistics for predictor variables and frequencies for outcome variables.

Predictor Variables	Mean	Standard Deviation
Threshold Point	55.28	25.3
Cue Utilisation	6.51	2.75

Criterion Variables	Frequency	
Guilty	30	
Not Guilty	78	

4.3.4. GEE and why it was appropriate to use with the current data set.

A GEE was used to analyse the current data. A GEE is a type of analysis that has been used to analyse repeated measures designs, longitudinal data, and data that are correlated (Ballinger, 2004; Estrada-Reynolds et al., 2015; Hanley, Negassa, Edwards, & Forrester), and was developed to allow repeated measures data that is not normally distributed, or does not meet parametric assumptions, to be analysed (Estrada-Reynolds et al., 2015). In addition, GEE's allow for correlation matrices to be selected, thus allowing correlated responses to be accounted for (Estrada-Reynolds et al., 2015). This method of analysis was chosen as the pre-threshold (68.3% of data) and Not Guilty conditions had a larger sample than their counterpart conditions (i.e., post-threshold (31.7% of data) and Guilty, respectively), and because the prior condition was only available in the pre-threshold condition. These unbalanced groups caused the homogeneity of variance assumption to be violated, and because GEE's do not need to meet said assumption, this test was more appropriate in comparison to an ANOVA (Estrada-Reynolds et al., 2015; Hong & Ottononi, 2017). Additionally, GEE's have been used to analyse similar data sets (see Estrada-Reynolds et al., 2015), and work most efficiently with sample sizes over 100; the current study has a sample size of 108.

4.3.4.1. *Data treatment for GEE.*

A varstocases command (allows complex data sets that are in columns to be restructured into rows) was used to restructure the data for the GEE (IBM Software Group, 2013). Time point (the prior point, each piece of evidence and the closing statements) and participant number were used as the subject and within-subjects variable, respectively. These variables were not analysed, however, and were only included in the model to allow the GEE to group the data together, thus allowing a specific time point for a particular participant to be identified (IBM Software Group, 2013). The two within-subjects factors

(i.e., evidence type (prior, prosecution and defence) and threshold (Pre and post)) and one between-subjects factor (verdicts given; Guilty and Not Guilty) was compared across the measure of likelihood of guilt.

4.3.4.2. *Descriptive statistics for likelihood of guilt ratings across evidence type, threshold and Verdict Given .*

The descriptive statistics highlighted that the likelihood of guilt rating was higher in the prosecution evidence condition in comparison to both the defence evidence and the prior point condition. The prior point had a lower likelihood of guilt rating when compared with the defence evidence condition. The pre-threshold condition had a lower mean likelihood of guilt rating in comparison to the post-threshold condition. Finally, Guilty verdicts had a higher likelihood of guilt mean when compared with Not Guilty verdicts. Table 9 presents the descriptive statistics for the factors of evidence type, threshold and Verdict Given .

Table 9

Descriptive statistics for evidence type, threshold and Verdict Given .

Variable	Prior	Prosecution	Defence	Pre-Threshold	Post-Threshold	Guilty	Not Guilty
Mean	31.82	61.34	52.29	51.07	62.05	70.71	48.35
Standard Deviation	25.78	24.95	25.06	26.33	25.04	21.71	25.44

4.3.5. Inferential statistics for Diffusion Threshold Model in two-verdict system.

A 2 (Guilty and Not Guilty) x 3 (prior, threshold and last) mixed factorial ANOVA was conducted to investigate whether or not the Diffusion Threshold Model can be applied to

juror decision making within a two-verdict legal system. There was a significant main effect of likelihood points found on likelihood of guilt ratings [F (1.48, 156.41) = 64.46, p <.001, η_p^2=.38]. Bonferroni pairwise comparisons showed that the prior point (M = 34.85; SD = 25.78) was significantly lower than the threshold point (M = 63.17; SD = 25.30) in relation to likelihood of guilt ratings (p <.001). The threshold point was significantly higher than the last point (M = 57.90; SD = 25.89) in relation to likelihood of guilt ratings (p =.01). The last point was significantly higher than the prior point when measuring likelihood of guilt ratings (p<.001).

A significant main effect of Verdict Given was found on likelihood of guilt ratings [F (1,106) =56.47, p <.001, η_p^2=.35]. Therefore, the likelihood of guilt was rated significantly higher in Guilty verdicts (*M* = 65.69; *SD* = 18.14) than it was in Not Guilty verdicts (*M* = 38.27; *SD* = 23.31).

A significant interaction was found between likelihood points and the Verdict Given across the likelihood of guilt measure [F (2, 212) =10.22, p <.001, η_p^2=.09]. See Figure 2 for a visual illustration of the interaction.
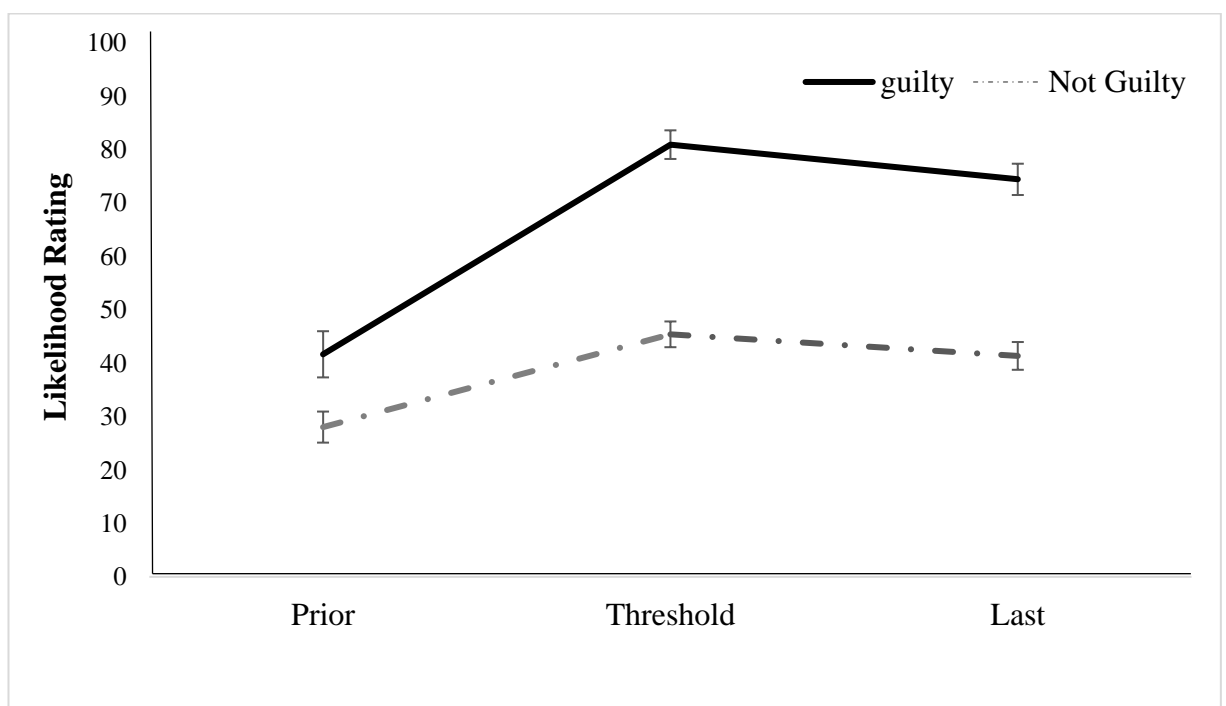
Figure 2. Interaction between Verdict Given and likelihood points in the two-verdict system.

Simple main effects highlighted that the prior point was significantly lower for Not Guilty verdicts in comparison to Guilty verdicts in relation to likelihood of guilt ratings ($p = .01$). The threshold point was significantly lower for Not Guilty verdicts in comparison to Guilty verdicts in relation to likelihood of guilt ratings ($p < .001$). Finally, the last point had a significantly lower likelihood of guilt rating in Not Guilty verdicts than it did Guilty verdicts ($p < .001$). Therefore, this interaction may be explained by the difference in the prior points being less significant than the other likelihood points when comparing across the verdict types.

In Guilty verdicts, the prior point had a significantly lower likelihood of guilt rating than both the threshold point ($p < .001$) and last point ($p < .001$). The last point had a significantly ($p = .03$) lower likelihood of guilt rating than the threshold point. In Not Guilty verdicts, the prior point had a significantly lower likelihood of guilt rating than both the threshold ($p < .001$) and last points ($p < .001$). The last point in Not Guilty verdicts was found to be significantly ($p = .03$) lower than the threshold point in relation to likelihood of guilt ratings. The current analysis highlighted that jurors in a two-verdict system may reach verdicts through information integration causing a threshold to be reached.

Post-hoc power analysis was run using the software G*power (Faul et al., 2007). The sample size was set to 108, and the analysis highlighted that the ANOVA for the Diffusion Threshold Model analysis was adequately powered, with an actual power of .82.

4.3.6. Inferential statistics for cue utilisation within two-verdict system.

An independent samples t-test found that there was a significant difference in cue utilisation between the verdicts given, with Guilty verdicts using significantly less cues

than Not Guilty verdicts; $t(106) = -8.69$, $p < .001$, $d = 1.93$. The equal variances assumed row was consulted because the Levene's test of equality of variances was non-significant; $F = .47$, $p = .49$. The results here support the findings of the last chapter (i.e., that acquittal thresholds are more greedy than Guilty thresholds).

4.3.7. Binary Logistic Regression testing the efficacy of the Diffusion Threshold Model within the two-verdict system.

A binary logistic analysis was conducted to test whether or not the predictor variables (threshold point and cue utilisation) reliably distinguished between Guilty and Not Guilty verdicts. First, it was found that cue utilisation was a significant predictor of the Verdict Given variable [$x^2(1) = 15.08$, $p < .001$]. Second, it was found that the threshold point was a significant predictor of the Verdict Given variable [$x^2(1) = 15.62$, $p < .001$]. A test of the full model (using the enter method) against a constant only model was statistically significant, showing that the predictor variables reliably distinguished between Guilty and Non Guilty verdicts [$x^2(2) = 84.22$, $p < .001$]. The model explained 78.1% of the variance in verdicts, and correctly classified 94.4% of the cases.

Table 10

Variables in the equation and their associated B Coefficients.

Variables	B Coefficient
Constant	-3.49
Threshold Point	0.10
Cue Utilisation	-0.71

The B coefficients highlighted that for every one unit increase in threshold point, it is expected that there will be a .10 increase in the log odds of being in a higher level of Verdict Given , given that all of the other variables in the model are held constant.

Further, for every one unit increase in cue utilisation, it is expected that there will be a .71 decrease in the log odds of being in a higher level of Verdict Given , given that all of the other variables in the model are held constant. Not Guilty verdicts were labelled as zero, and Guilty verdicts were labelled as one in the current analysis. Therefore, the results showed that with every one unit increase in the threshold point, individuals are more likely to give a Guilty verdict and with every one unit increase in cue utilisation participants are less likely to give a Guilty verdict.

4.3.8. GEE analysis for testing information integration and confirmation bias.

4.3.8.1. *The selection of a correlation matrix.*

First, an unstructured correlation matrix was not chosen, as the data was imbalanced with regard to the factors of threshold and Verdict Given (Jang, 2011). A first order autoregressive correlation matrix was not chosen because the time points were not made at equal measurements in time, thus meaning that said correlation matrix was not suitable for the current data set (Jang, 2011). The exchangeable correlation matrix was not chosen, as this correlation matrix type is used more in split plot designs with smaller samples (Jang, 2011), and was consequently not suitable for the current data set. The m-dependent correlation matrix was not consulted as it was not applicable to the current data set because at no point did the correlation coefficients reach zero (Stupicia, 2011). An independent correlation matrix was used for three reasons. First, Pan and Connett (2002) said that a researcher: *"…does not even have to model the correlation structure of the response variable correctly; one only needs to use some working correlation structure to obtain consistent and asymptotically normal estimates."* (p.476). Further, GEE results show consistent standard error and parameter estimates regardless of whether the right correlation matrix is chosen (Stupicia, 2011; Weaver, 2009). Second, Pan and Connett (2002) suggested that

the independent correlation matrix is both efficient and convenient when analysing repeated measures designs. Finally, the quasi-likelihood under independence model criterion in the Goodness of fit box was lower for the independent correlation matrix (QICC = 603642.90) than it was for the unstructured (QICC = 648218.57), auto-regressive (QICC = 627455.471) and exchangeable (QICC = 603698.04) correlation matrices; indicating that the model was a better fit when an independent correlation matrix was used (Stupicia, 2011). In summary, the independent correlation matrix was utilised.

4.3.8.2. *GEE analysis of the likelihood of guilt values across threshold, evidence type and Verdict Given .*

The GEE compared the factors of threshold (pre and post), evidence type (prior, prosecution and defence) and Verdict Given (Guilty and Not Guilty) across the measure of likelihood of guilt. This analysis was conducted to investigate whether or not information integration allowed thresholds to be reached, and to test whether or not thresholds promoted evidence distortion.

Verdict type was found to have a significant main effect on the likelihood of guilt ratings [Wald X^2 (1) = 50.20, p <.001]. Guilty verdicts (Estimated Marginal Means (EEM) = 65.43) had a higher likelihood of guilt rating in comparison to Not Guilty verdicts (EMM = 44.65).

Threshold was found to be having a significant main effect on likelihood of guilt ratings [Wald X^2 (1) = 4.38, p =.04]. It was shown that the likelihood of guilt ratings were higher post-threshold (EMM = 62.28) in comparison to pre-threshold (EMM = 50.21).

Evidence type was also found to have a significant main effect on likelihood of guilt ratings [Wald X^2 (2) = 276.38, p <.001]. The prior point (EMM = 34.85) had a significantly lower likelihood of guilt rating in comparison to the defence evidence

condition (EMS = 54.64; *p* <.001). The likelihood of guilt rating for the defence evidence condition was significantly lower in comparison to the prosecution evidence condition (EMM = 65.53*; p* <.001). The prior point also had a significantly lower likelihood of guilt rating in comparison to the prosecution evidence condition (*p* <.001). The EMMs from the GEE were slightly different to the means that were reached from the explore function in SPSS; see Table 9.

A significant interaction was found between the variables of evidence type, Verdict Given and threshold [Wald X^2 (5) = 29.25, *p* <.001]. Sidak post hoc tests were used in the current study as they avoid type 1 errors, they can take into account uneven conditions (i.e., less conservative than Bonferroni tests), and they keep more statistical power in comparison to the Least Significant Difference Test (LSD; Keppel & Wickens, 2004). See Figures 3, 4, 5, 6, and 7 for a visual illustration of the interactions found between the factors of evidence type, threshold and Verdict Given .
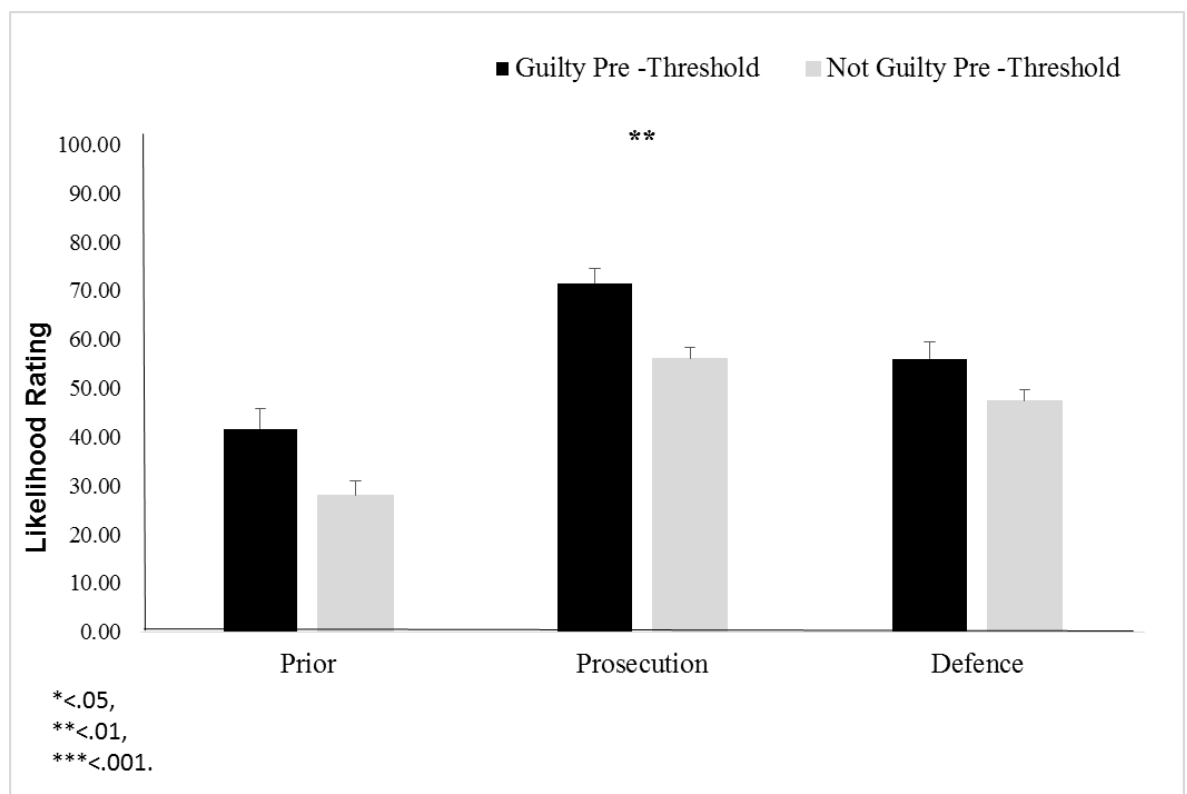
Figure 3. Interaction between evidence type and Verdict Given within the pre-threshold condition.

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Figure 3 shows that in the pre-threshold condition, prosecution evidence generated significantly higher likelihood of guilt ratings in Guilty verdicts in comparison to Not Guilty verdicts.
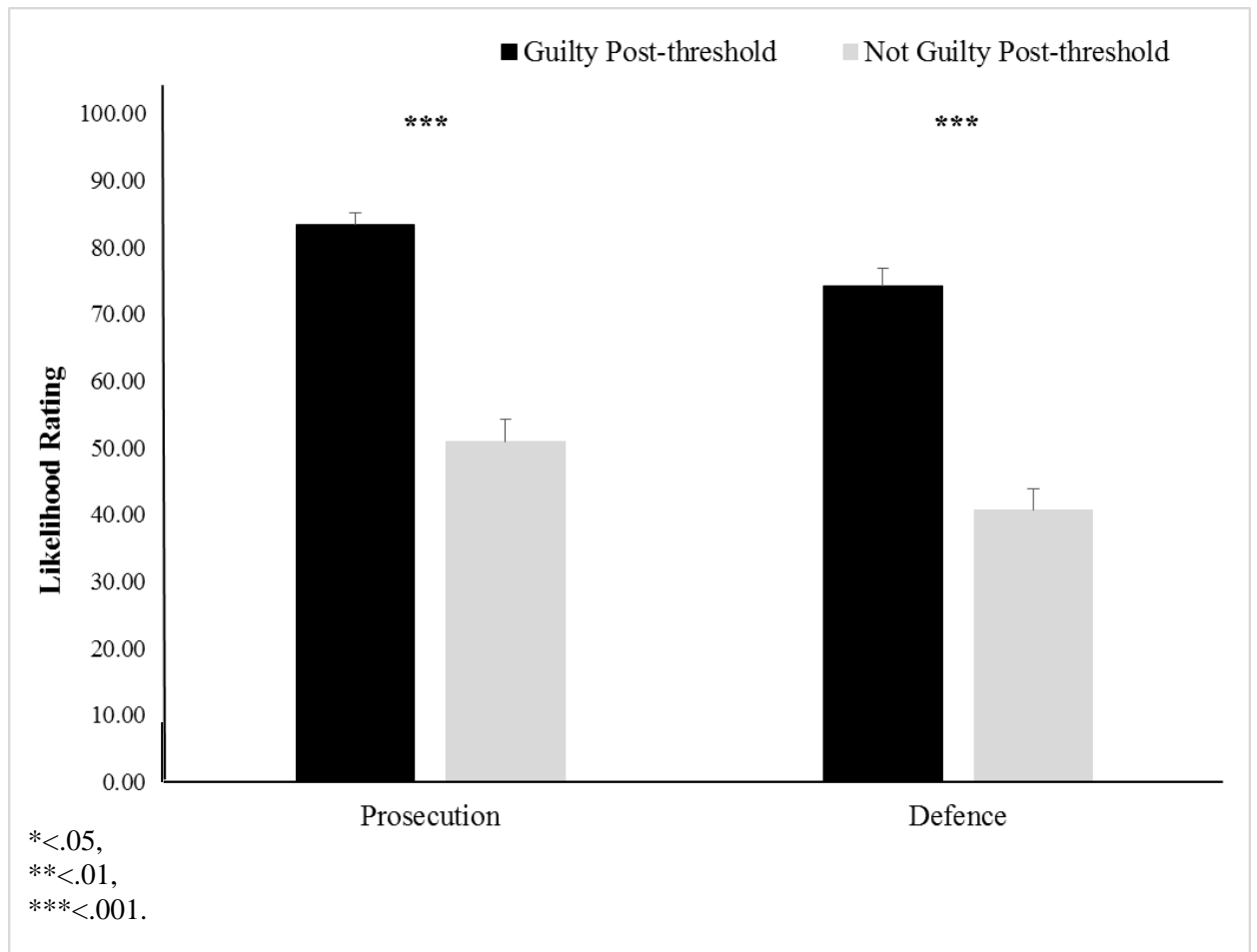
Figure 4. Interaction between evidence type and Verdict Given in the post-threshold condition.

Figure 4 highlights that in the post-threshold condition, both prosecution and defence evidence generated significantly higher likelihood of guilt ratings when a Guilty verdict was given in comparison to when a Not Guilty verdict was given, thus suggesting that thresholds may promote confirmation bias.
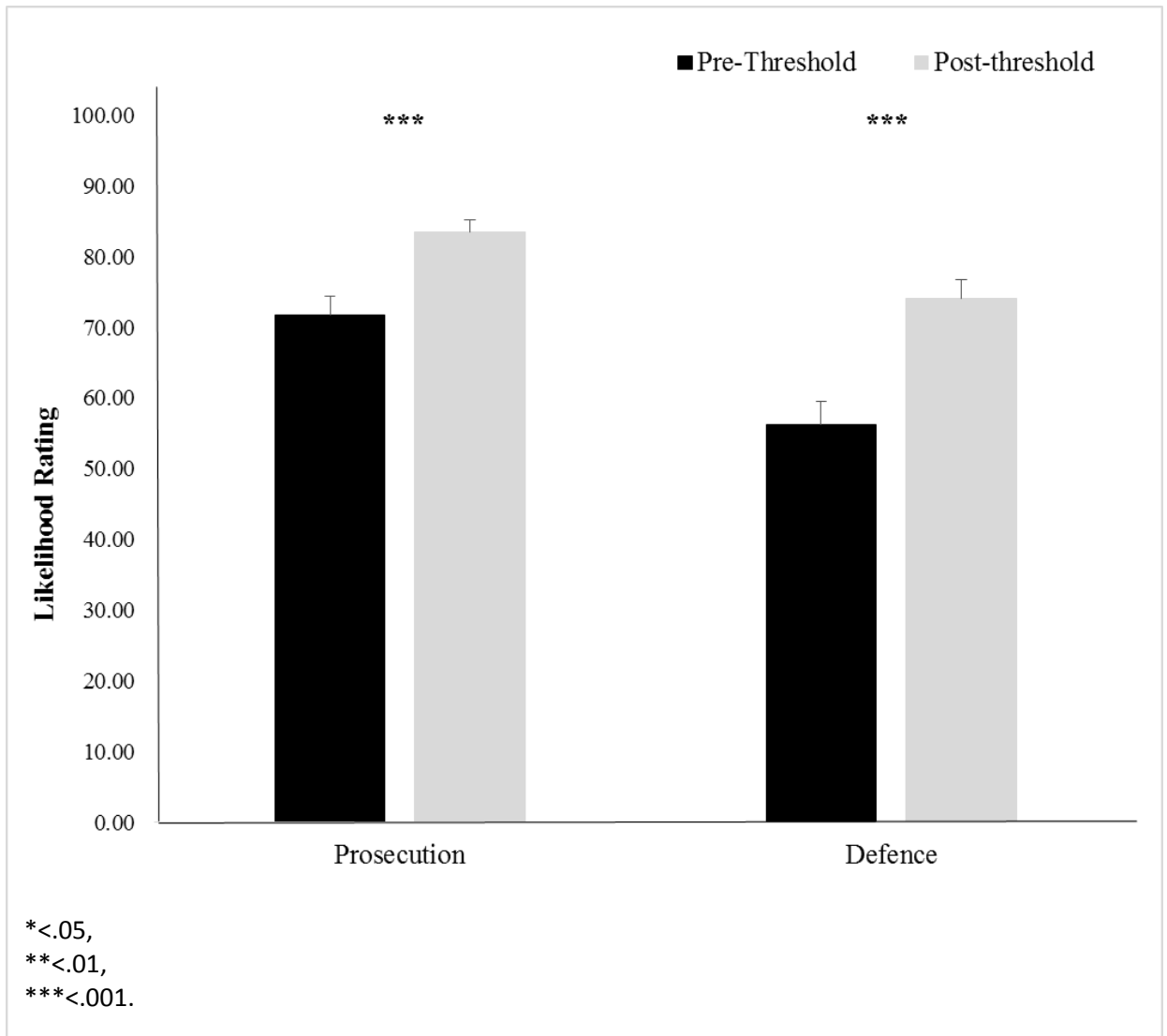
Figure 5. Interaction between threshold condition and evidence type in Guilty verdicts.

Figure 5 shows that in Guilty verdicts, both prosecution and defence evidence generated significantly higher likelihood of guilt ratings post-threshold in comparison to pre-threshold, thus suggesting that thresholds may promote confirmation bias.
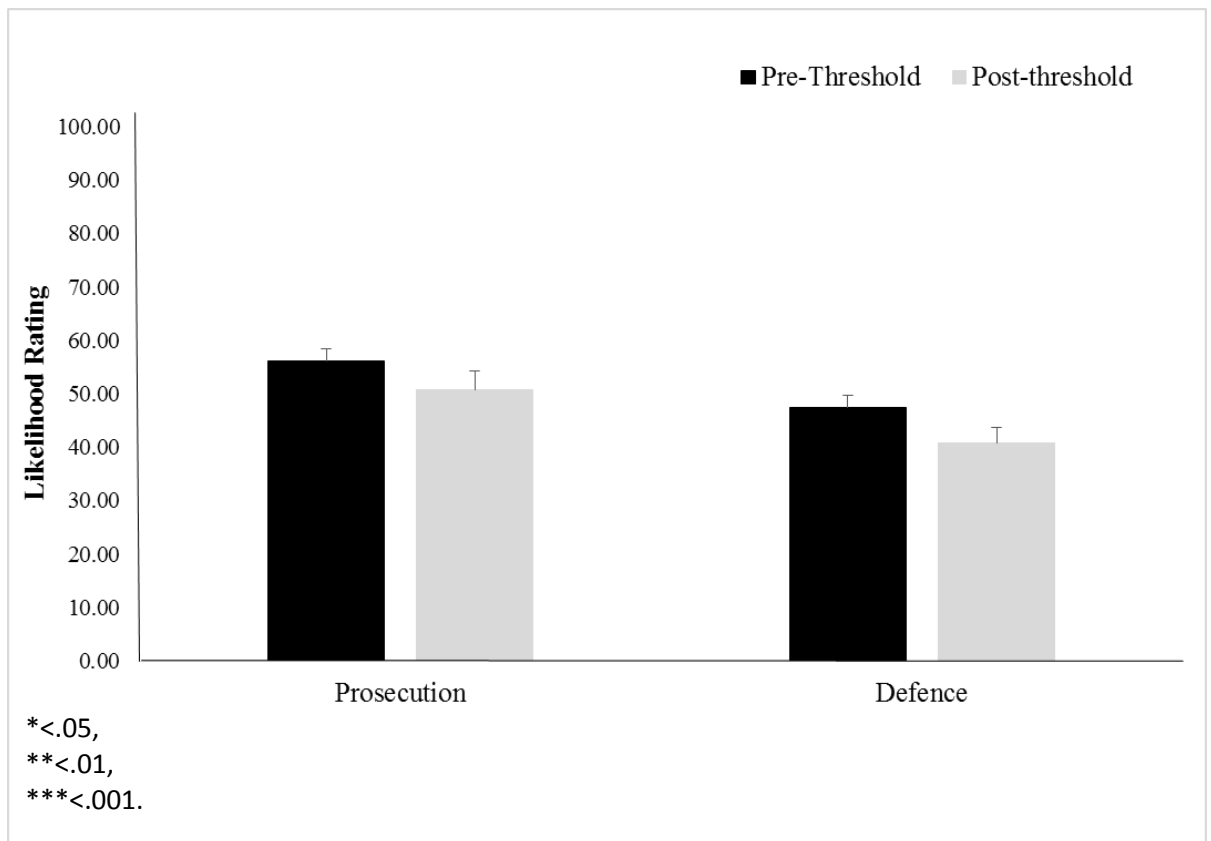
Figure 6. Interaction between evidence type and threshold condition in Not Guilty verdicts.

Figure 6 highlights that there was no significant differences between the pre-threshold and post-threshold likelihood of guilt ratings, for both prosecution and defence evidence, when a Not Guilty verdict was given.
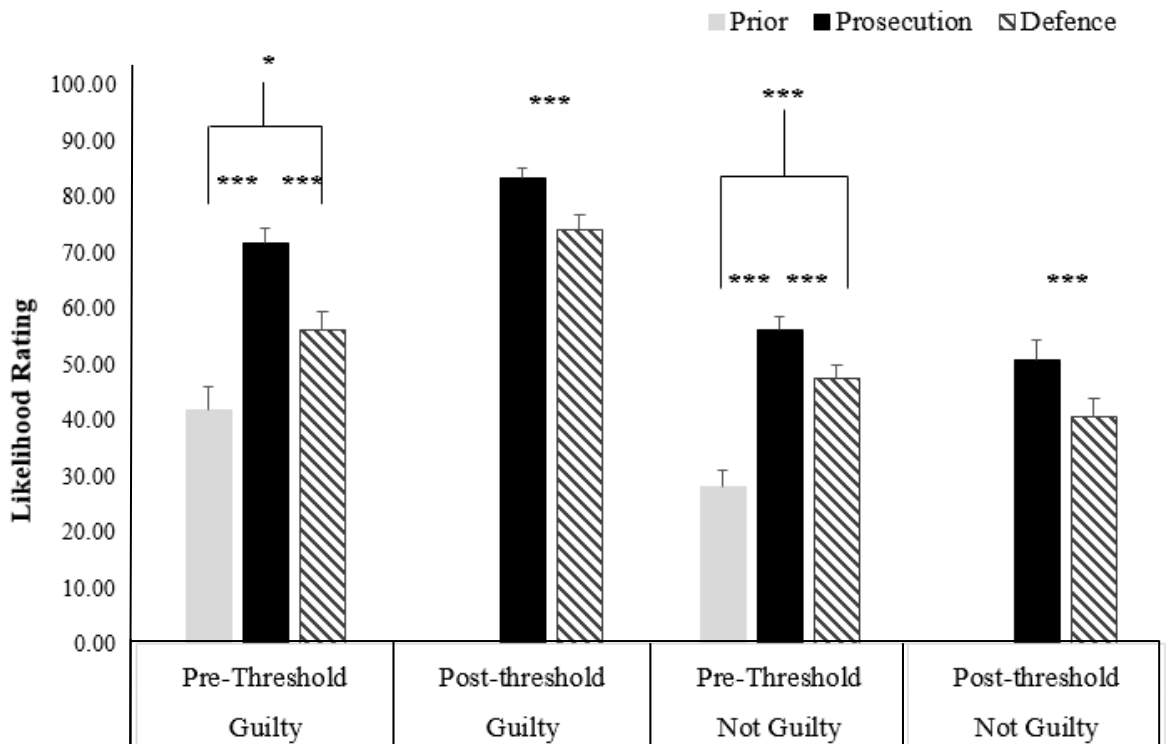
Figure 7. Interaction between evidence type, Verdict Given and threshold condition across the likelihood of guilt measure.

Figure 7 highlights that regardless of threshold condition or Verdict Given , defence evidence generated significantly lower likelihood of guilt ratings in comparison to prosecution evidence, thus suggesting that information integration occurred throughout juror decision processes.

4.4. Discussion

The current study aimed to answer two main questions. The first research question related to identifying whether or not information integration allowed thresholds to be reached. The second research question related to investigating whether or not the reaching of a threshold promoted evidence distortion. In addition, the study aimed to assess if the

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Diffusion Threshold Model could be applied to a two-verdict juror setting. First, the discussion will explore whether the Diffusion Threshold Model can be applied to a two-verdict juror setting. Second, a discussion surrounding the findings of confirmation bias and information integration will follow. Then, a broader discussion around limitations and future directions will be presented.

4.4.1. Diffusion Threshold Model in two-verdict system.

Before exploring the impact of thresholds on confirmation bias, the applied value of the Diffusion Threshold Model within a two-verdict setting will be discussed. It was hypothesised that there would be a significant interaction between Verdict Given and likelihood points in relation to likelihood of guilt ratings; this hypothesis was accepted. The current results showed that the threshold points were distinct and significantly different to the prior points, showing that jurors (in both verdict types) integrated information until they reached a threshold, which then allowed a response to be give (see Chapter Three discussion for a fuller explanation of the process). In addition, Guilty verdicts were given using significantly fewer pieces of information than Not Guilty verdicts, which highlights that the Diffusion Threshold Model can encompass both rational and intuitive decision making through allowing thresholds to vary in regard to cue utilisation.

In contrast to the findings of the previous study in Chapter Three, the current results showed that the prior points of Guilty and Not Guilty verdicts differed significantly from one another, which may have indicated that pre-trial biases were present within the jurors. Previous research has shown that pre-trial biases are prevalent in juror decision making, and that said biases may influence evidence interpretation and the verdict that is chosen (De La Fuente et al., 2003; Lecci & Myers, 2008; Smith & Bull, 2014). The different

legal environments that were applied across the current and previous piece of research in the present thesis may have caused this difference in findings concerning the prior points. In the previous study, three-verdict options were available, while only two-verdict options were available in the current study. Simon (1956) once stated that cognition and the environment interact with one another when an individual is making a decision. Therefore, the legal environment (i.e., how many verdicts are available) may interact with pre-beliefs (cognition) when a juror is making a decision. Pre-trial biases may be attenuated in a three-verdict system, as the decision maker does not need to think in absolute terms of guilt (Jackson, 1998), and can consequently give a less biased initial perception of guilt. However, this point is purely speculative and should be investigated further in future research.

Interestingly, the last point was significantly lower than the threshold point in Guilty verdicts. This may suggest that jurors who gave a Guilty verdict in the two-verdict system would have given a Not Proven verdict in a three-verdict system, as their drift may have caused them to re-surpass the Guilty threshold. In the current two-verdict system, however, the last point was closer to the Guilty threshold than it was to the Not Guilty threshold, and no middle option was available, which meant that a Guilty verdict might have been a more appropriate verdict to choose. Nevertheless, future research is needed to test the differences between the two and three-verdict system.

A binary logistic regression was also conducted to check how reliable the results of the ANOVA were. The results highlighted that the model (which included both cue utilisation and threshold point) significantly predicted the verdicts that were given, and correctly classified verdicts in 94.4% of cases. Further, it was found that as the threshold point increased participants were more likely to give a Guilty verdict and as cue utilisation increased the participants were more likely to give a Not Guilty verdict. Therefore, jurors reach thresholds, which vary in regard to both how much information is needed to support

them and the verdicts they support, and these thresholds then inform the verdict that is ultimately given. These results are very supportive of the ANOVA analysis previously mentioned, and thus provides reliability and depth to the overall analysis.

In summary, the current findings highlighted that the Diffusion Threshold Model of decision making can be applied to jurors within a two-verdict system. Jurors start at a prior point and drift to a threshold point, which then allows a verdict response to be given. The next section will discuss whether or not information integration allowed threshold to be reached and will examine if thresholds promoted confirmation bias/evidence distortion.

4.4.2. Information integration, confirmation bias and thresholds.

The current section will discuss information integration and its role in allowing thresholds to be reached. The section will then progress to an examination of confirmation bias/pre-decisional distortion, and the role that thresholds play in promoting said bias/distortion. Finally, a general discussion will be presented that outlines how the Diffusion Threshold Model of decision making can encompass both information integration and confirmation bias.

The results highlighted that regardless of the threshold condition (pre vs. post) or the Verdict Given (Guilty vs. Not Guilty), prosecution evidence generated higher likelihood of guilt ratings than defence evidence. These results support information integration and similar findings have been found in previous juror research. For instance, Estrada-Reynolds et al. (2015) found that jurors in a death penalty case increased their sentence recommendations with prosecution evidence, and decreased their sentence recommendations with defence evidence. Kaplan and Miller (1978) found that jurors integrate pre-trial biases and evidence from a trial when reaching a verdict. They also

found that biases could be attenuated by increasing the strength of the evidence in court, which provides further evidence for information integration, as the integration of strong evidence counteracts the effects of pre-trial biases. The current results, therefore, are in line with previous research relating to information integration theory.

In relation to the first research aim, it is interesting that in the pre-threshold condition that prosecution evidence generated significantly higher likelihood of guilt ratings than defence evidence, regardless of the Verdict Given . In addition, it was found that Guilty and Not Guilty thresholds were distinct both in terms of likelihood of guilt ratings and cue utilisation; see section above. These results taken together suggest that jurors integrate information (increase with prosecution evidence and decrease with defence evidence), and that this information integration allows threshold to be reached. This is the first direct evidence of information integration allowing thresholds to be reached within a juror decision making setting. However, Ratcliff and Smith (2004) did provide evidence of the same process occurring in perceptual decision making tasks.

In summary, the current section has highlighted that jurors are able to reach verdicts through information integration and varying thresholds. However, research by Carlson and Russo (2001) highlighted that once a leading verdict is developed that evidence is distorted to support said verdict, and Estrada-Reynolds et al. (2015) found that pre-trial biases could forecast final sentence recommendations, which again supports the presence of confirmation bias in jurors. Therefore, the current results surrounding information integration do deviate from the results found by other researchers. Next a discussion surrounding whether or not thresholds can explain previous findings of confirmation bias/evidence distortion in jurors will be given.

The current study found that the variables of Verdict Given , evidence type, and threshold all significantly interacted with one another when producing likelihood of guilt ratings,

which highlighted that juror's perceptions of guilt, based on the evidence presented, were altered depending on the threshold (i.e., Guilty threshold versus Not Guilty threshold) that was reached, thus suggesting that thresholds may promote confirmation bias. Each of the main findings will now be discussed.

First, it was found that regardless of the evidence type (prosecution and defence evidence) likelihood of guilt ratings were higher for Guilty verdicts post-threshold than they were for Not Guilty verdicts post-threshold, which suggested that confirmation bias was present. This suggests that when a Guilty threshold is reached that prosecution evidence is seen positively to confirm said threshold, and defence evidence is either disregarded (and does not affect the drift of the decision maker) or is distorted to support the current threshold (Nickerson, 1998). When a Not Guilty threshold was reached, the opposite pattern may have occurred, with defence evidence being seen more favourably than prosecution evidence, thus causing the latter evidence type to either be disregarded or distorted to support the current threshold.

The current results are consistent with a number of pieces of previous research. Carlson and Russo (2001) found that once jurors reached a leading verdict (i.e., threshold) then they distorted novel evidence to support said verdict. Ask et al. (2008) discovered that participants in a homicide trial rated disconfirming evidence as less reliable than confirming evidence. Smith and Bull (2014) highlighted that individuals with a pro-prosecution bias towards forensic evidence perceived weak DNA evidence to be strong. When interpreting the current studies results in light of previous research, it is clear that once a juror has acquired a preference for a certain verdict through reaching a threshold, they will perceive supporting evidence positively (Smith & Bull, 2014), and disconfirming evidence will either be seen as less reliable (Ask et al., 2008) or will be distorted to support the current threshold/leading verdict (Carlson & Russo, 2001).

Second, it was found that when a Guilty verdict was given that the likelihood of guilt ratings were significantly higher post-threshold in comparison to pre-threshold, regardless of evidence type. This suggested two things: 1) that jurors integrate more information pre-threshold than they do post-threshold; and 2) that in Guilty verdicts the evidence is perceived to support the prosecution more post-threshold in comparison to pre-threshold. In addition, the fact that this preference for the prosecution occurred regardless of the evidence type, suggested that defence evidence was being distorted, or disregarded, to support the leading verdict (Carlson & Russo, 2001). The current results highlighted that thresholds may act as a catalyst for confirmation bias and evidence distortion.

Thresholds may promote confirmation bias/evidence distortion through two well-cited cognitive mechanisms: belief persistence and cognitive dissonance (Findley & Scott, 2006). Thresholds may symbolise the point where a juror generates a belief surrounding their preferred verdict (Guilty or Not Guilty), and once this belief is generated, it is open to attack from novel information that supplies competing belief systems, cognitive dissonance may then occur in the juror as results of these conflicting beliefs of guilt (Jonas et al., 2001). For example, if a juror reaches a Guilty threshold and defence evidence is then presented, the juror may become victim to cognitive dissonance. The juror may then try to reduce this discomfort by distorting or disregarding disconfirming evidence, thus promoting confirmation bias. In addition, once a threshold is reached and a verdict belief is acquired, jurors may interpret novel information in line with their current threshold, which may then cause them to fall prey to belief persistence (Findley & Scott, 2006); see Figure 8 for visual illustration of how thresholds may promote confirmation bias.
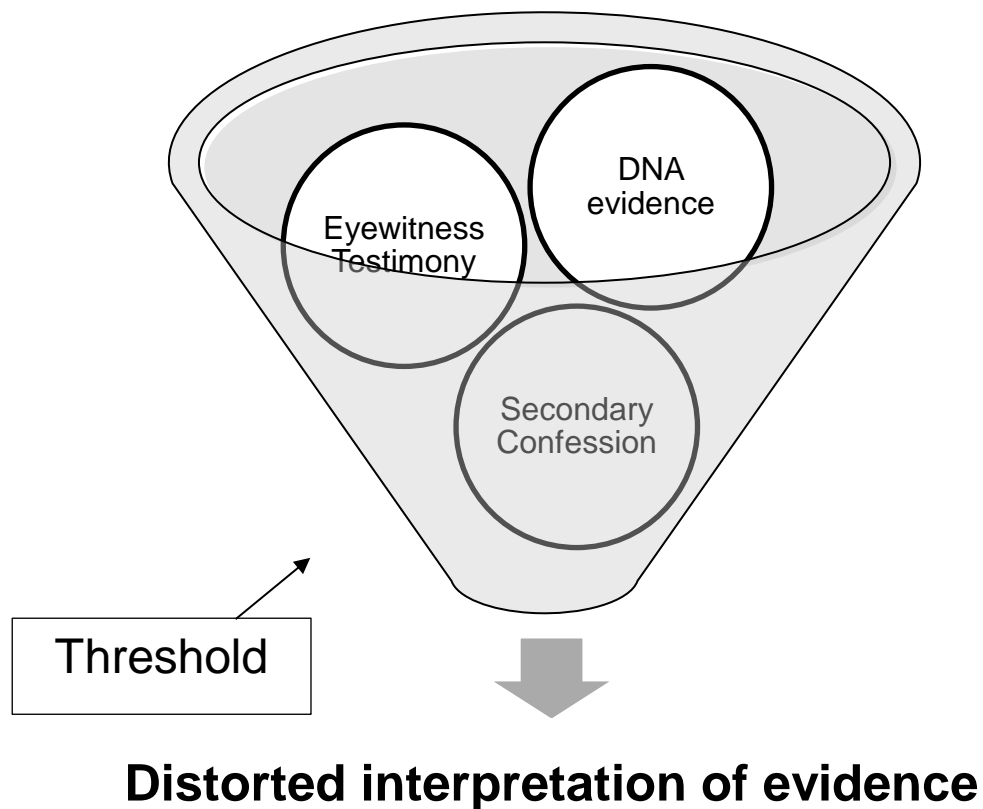
Figure 8. A threshold effect on novel evidence.

It was found in Not Guilty verdicts, however, that no significant differences existed in relation to likelihood of guilt ratings, for both evidence types, when comparing the pre-threshold condition with the post threshold condition. This may have highlighted that Not Guilty thresholds may be less likely to promote confirmation bias and evidence distortion in comparison to Guilty thresholds, thus suggesting that the decision process behind Not Guilty verdicts was more rational than the decision process behind Guilty verdicts. Jackson (1998) stated that Not Guilty verdicts in a two-verdict system may be given when a juror believes that the defendant might be guilty but has doubt because of a lack of evidence being provided. In addition, the current study found that Jurors who gave Not Guilty verdicts used significantly more pieces of information than jurors who gave Guilty verdicts. Consequently, jurors may be less emotionally invested in Not Guilty thresholds in comparison to Guilty thresholds, as the former type of threshold may be reached because of a collection of evidence causing doubt (Miller et al., 2011) rather than a belief

of innocence being formed; whereas, the latter type of threshold may be reached by a frugal amount of information creating a belief of guilt (Jackson, 1998). It could be argued, that Not Guilty thresholds may be a threshold of doubt rather than a threshold that represents a belief, thus cognitive dissonance may be less likely to occur when a Not Guilty threshold is reached, as novel evidence will not be attacking an existing belief (Jonas et al., 2001). Nevertheless, this explanation may not be adequate as the last point was found to be significantly lower than the threshold point in Not Guilty verdicts, highlighting that the Not Guilty threshold may have promoted confirmation bias/distortion.

An alternative explanation for this lack of significance is that the drift (perception of guilt) in Not Guilty verdicts was already low from an early stage in the decision making process, which may have caused a floor effect. This floor effect may have stopped the decline of likelihood of guilt ratings in the post-threshold condition, when compared to the likelihood of guilt ratings given in the pre-threshold condition, from reaching significance. Pre-trial biases may explain why some jurors (i.e., the ones that gave Not Guilty verdicts) perceived the defendant to be innocent from the beginning of the vignettes (Lecci & Myers, 2008), as previous research has shown that pre-trial biases influence juror perceptions of guilt at the beginning of a trial (Ruva, McEvoy, & Becker, 2007) affect how jurors interpret evidence throughout a trial (Smith & Bull, 2014). Two findings in the current study suggested that pre-trial biases might have been present. First, the prior point (see 'Diffusion Threshold Model in two-verdict system' section above) was found to be significantly higher in Guilty verdicts than it was in Not Guilty verdicts. Second, prosecution evidence was found to generate significantly higher likelihood of guilt ratings in Guilty verdicts than they did in Not Guilty verdicts, which should not have occurred if no bias was present. In summary, pre-trial biases may have caused the jurors who gave Not Guilty verdicts in the current study to be biased towards the defence from

the beginning of the vignettes and to have low perceptions of guilt throughout said vignettes, which may have produced a floor effect when comparing the pre- and post-threshold conditions in relation to the likelihood of guilt ratings.

In addition, the results highlighted that prosecution evidence generated significantly higher likelihood of guilt ratings in the post-threshold condition than defence evidence, regardless of verdict type. However, in the post-threshold condition both prosecution and defence evidence generated significantly higher likelihood of guilt ratings in Guilty verdicts than they did in Not Guilty verdicts (as mentioned above). These results taken together show two things: 1) that evidence is distorted to confirm the threshold that is reached; and, 2) that information integration occurs post-threshold.

These findings are similar to those found by Estrada-Reynolds et al. (2015), as their research provided evidence for both information integration and evidence distortion. However, Estrada-Reynolds et al. (2015) could not adequately explain the dissonance in their findings. The current study proposes that once a threshold is reached that a juror generates a belief surrounding which verdict they prefer, thus causing cognitive dissonance (as stated above), and that disconfirming evidence can be distorted to reduce cognitive dissonance. Nevertheless, in some scenarios the evidence (e.g., DNA evidence) may be too strong to ignore or distort (Ask et al., 2008). The juror may then integrate said piece of evidence into their perception of guilt without changing their leading verdict/threshold, thus reducing cognitive dissonance through, limited, information integration. If the evidence is strong enough, it may be possible for verdict reversals to occur, although this enquiry is outwith the scope of the current study.

Overall, the current study highlighted that jurors integrated information until they reached a threshold (Ratcliff & Smith, 2004). This threshold then acted as a leading verdict, which competed with novel belief systems provided by new evidence (Jonas et al., 2001). To

reduce the cognitive dissonance formed by these competing beliefs, evidence was distorted to support the leading threshold. However, in Not Guilty verdicts, the likelihood of guilt ratings did not decrease significantly post-threshold in comparison to pre-threshold, but this may have been caused by a floor effect. Some information integration may have occurred post-threshold as to integrate strong pieces of evidence within the decision process, without causing verdict reversals. The current results do answer the questions above, as the results suggested that thresholds are reached through information integration and that confirmation bias is promoted through thresholds being reached. The next section will discuss potential limitations of the current study.

4.4.3. Limitations.

One limitation relates to how the threshold variable was measured. Participants were asked to state the last piece of information they needed to make a decision, and this response was used to create the threshold variable; likelihood of guilt ratings given before this response were categorised within the pre-threshold condition and likelihood of guilt ratings given after this response were classified in the post-threshold condition. However, participants may have fallen prey to hindsight bias, and this may have caused them to overestimate how early they reached their threshold (Arkes, Wortmann, Saville, & Harkness, 1981). Participants were also asked to state a likelihood of guilt rating after each piece of evidence, which may have promoted more rational processing, thus causing information integration to be found in the current study. Nevertheless, the current study could not have investigated information integration or the influence of thresholds on evidence distortion without asking participants to state both likelihood of guilt ratings after each piece of evidence and the last piece of information they needed to make their

decision. The current design may have had some issues, but the current study could not have conducted without including the above measures.

A second limitation of the current study related to poor ecological validity, as participants in the current study, unlike real jurors, knew their responses did not have real world impacts. The researcher tried to enhance the ecological validity of the current quasi-experiment as much as possible though. For instance, an actor was paid to read out the vignettes, which allowed audio tapes to be created. These audio tapes allowed participants to listen to the vignettes, as it was believed that this would be more ecologically valid, in comparison to the previous quasi-experiment, as real jurors hear information rather than read it. In addition, the procedure of the current quasi-experiment was designed to mirror a court setting in a number of ways, as prosecution evidence was always presented first and closing statements were provided. Therefore, this quasi-experiment was deemed less artificial in comparison to the previous quasi-experiment.

Additionally, previous research, discussed in the previous chapter, has suggested that cognitive mechanisms act the same in an experimental setting as they would in a real life setting (Hastie et al., 1983; MacCoun, 1989, Watt & Quinn, 2008). Research by Pezdek et al. (2010) found that it is the content presented to participants, not the manner of how it is presented, that is important in juror experiments. Therefore, it could be argued that the low ecological validity of the current quasi-experiment is unlikely to have influenced the participants in this study. The next section will discuss the implications of the current study and future lines of enquiry that this thesis aims to investigate.

4.4.4. Implications and future research.

There are several implications from the current piece of research. The first implication, specifically for legal professionals in America who use the Voir Dire process (i.e., juror selection (Lecci, Snowden, & Morris, 2004), was that initial biases from jurors may influence the overall decision process. These initial biases may anchor the juror's perception of guilt, which may then influence how novel evidence was interpreted (Smith & Bull, 2014), thus causing certain thresholds to be favoured from the beginning of the trial/vignettes; similar to how prior points can be biased towards certain thresholds in Ratcliff and Smith's (2014) description of the Diffusion Threshold Model. Future research should investigate the influence that beliefs/biases may have on the overall decision making process, which will help to further illuminate the current findings.

Another implication from the current piece of research is that thresholds may allow confirmation /evidence distortion to occur, as thresholds may symbolise the first time a juror creates a belief regarding which verdict they prefer. This promotion of confirmation bias may impede on the legal systems ability to deliver justice to society, and may make the trial by jury process unfair for legal actors (i.e., the prosecution and the defence). To prevent said negative effects, thresholds with a high cue utilisation (i.e., using all the evidence in a trial) should be promoted. Judges do currently instruct jurors to only make a verdict once they have heard all of the evidence provided in court, but these instructions are normally given once all the evidence has already been presented (Diamond, 1993), thus the current study would propose that jurors be given said instructions at the beginning of a trial (Carlson & Russo, 2001), as this may help to stop thresholds being reached prematurely and may attenuate confirmation bias in jurors. In addition, the current research, and similar research, should be used by judges to highlight to jurors the dangers

of reaching a threshold (i.e., favouring a verdict) before all the evidence has been heard (Carlson & Russo, 2001).

Despite meeting the research aims/questions of the thesis so far, many questions have been left unanswered or have indeed been raised by the findings of the current study. First, what impact do pre-trial biases have on juror's perceptions of guilt? The current study highlighted that jurors who gave different verdicts gave significantly different prior points. This may suggest that pre-trial biases (i.e., pro-prosecution and pro-defence) influence how jurors enter a trial and how they perceive the evidence presented (Smith & Bull, 2014), which may then influence the verdict that is chosen (Lecci & Myers, 2009). The next chapter aims to study the influence that pre-trial biases may have on jurors.

Second, what impact does different verdict systems (three vs. two) have on juror decision making? The first quasi-experiment in this thesis investigated the Diffusion Threshold Model in jurors within a three-verdict setting, whereas the current chapter investigated the same model within a two-verdict setting. However, the researchers are unaware if the two systems had differing effects on the participants; the next chapter aims to rectify this.

In summary, future research should investigate the influence that different legal environments (Simon, 1956), cognitive processes and individual differences (in initial beliefs/biases; Estrada-Reynolds et al., 2015) have on juror perceptions of guilt and the verdicts they choose to give. The next chapter, therefore, will take a bounded rationality approach to juror decision making.

4.5. Conclusion

In conclusion, the current piece of research has shown two things: 1) that information integration allowed thresholds to be reached; and 2) that confirmation bias may be

promoted by a threshold being reached. The results highlighted that in the pre-threshold condition, prosecution evidence generated significantly higher likelihoods of guilt ratings in comparison to defence evidence (regardless of verdict type), which suggested that information integration allowed thresholds to be reached. It was also found that regardless of evidence type (prosecution and defence), likelihood of guilt ratings were significantly higher for Guilty verdicts post-threshold than they were for Not Guilty verdicts post-threshold. This highlighted that confirmation bias may be promoted through a threshold being reached. In addition, the results showed that in Guilty verdicts both evidence types generated significantly higher likelihood of guilt ratings post-threshold in comparison to pre-threshold, which once again suggested that confirmation bias might be promoted through a threshold being reached. However, there were a number of limitations in relation to the current quasi-experiments design, but it was believed that the current design was necessary to investigate information integration and confirmation bias. The current study has negative implications for juror decision making (i.e., thresholds may promote confirmation bias), and it can be argued that the trial by jury process should be amended to increase thresholds in relation to cue utilisation, thus allowing confirmation bias to be attenuated. The next section will take a bounded rationality approach to juror decision making, and will investigate how differences in both the decision environment and decision maker influence perceptions of guilt and the verdict chosen.

5. Chapter Five: Anchors are not just for sailors: The effects of evidence anchors, pre-trial biases and available outcomes on perception of guilt and verdicts.

5.1. Introduction

The findings from the previous chapters have highlighted the Diffusion Threshold Model of decision making can adequately explain how jurors reach verdicts in both a three and two-verdict system. Further, the thesis, so far, has shown that jurors reach verdicts through information integration and varying thresholds, and that thresholds promote evidence distortion when forming judgements. The current chapter, however, will investigate potential factors that may make the trial by jury process unfair for legal actors (i.e., the prosecution and the defence); these factors have been selected based on previous literature and from questions raised in previous chapters.

The first factor that may impede on the fairness of the trial by jury process that will be investigated in the current chapter is pre-trial biases. The previous chapter highlighted that jurors who gave Guilty verdicts had significantly higher prior points than jurors who gave Not Guilty verdicts, suggesting that pre-trial biases may have influenced juror perceptions of guilt. In addition, previous research has shown that pre-trial biases influence sentence recommendations and can be used to forecast verdicts (Estrada-Reynolds et al., 2015; Lecci & Myers, 2009), which may highlight that juror perceptions of guilt and the verdicts they choose are also impacted upon by pre-trial biases. Consequently, the current chapter aims to study the influence that pre-trial biases may have on juror perceptions of guilt and the verdicts they choose.

The second factor that will be investigated is the anchoring and adjustment heuristic (Tversky & Kahneman, 1974). The anchoring and adjustment heuristic is a commonly studied and well-known heuristic, which proposes that decision makers use previous

values as anchors, and then adjust from these anchors when making a prediction or decision (Tversky & Kahneman, 1974). Previous research by Chapman and Bornstein (1996) found that strength anchors (Strong vs. weak) influenced binary liability judgements and scale causality judgements within a civil court trial; this will be discussed further in section '5.1.3. The anchoring and adjustment heuristic and its influence on juror decision making' of the current chapter. However, there has been no previous research on the influence that strength anchors have on juror perceptions of guilt, which is similar to a causality judgement, and the verdicts they choose, which is comparable to a liability judgement, within a criminal trial, the current chapter aims to rectify this.

The third factor that was selected relates to how many verdicts are available to the juror. This factor was selected as Chapter Three investigated juror decision processes within a three-verdict system and Chapter Four investigated juror decision processes within a two-verdict system. However, the current thesis has not investigated how these different verdict systems may influence jurors when they are making a decision. Previous research has highlighted that the inclusion of the Not Proven verdict reduces the chances of a Not Guilty verdict being given by jurors in both sexual and physical assault trials (Hope et al., 2008). The current chapter, therefore, aims to investigate whether or not the inclusion of the Not Proven verdict reduces the amount of Not Guilty verdicts given in homicide trials.

 In summary, the current chapter takes a bounded rationality approach to juror decision making by testing how cognition (through the anchoring and adjustment heuristic), individual differences (i.e., pre-trial biases) and the environment (i.e., legal outcomes available) impacts on juror perceptions of guilt and the verdicts they choose. Before the methodology and results of the current chapter are presented, a review of the relevant literature will be outlined. This literature review will begin by providing the reader with some context on why the current study is important. Then the literature review will

progress to discussing previous research that has investigated the influence that pre-trial biases have on juror decision making. After this, a discussion surrounding the anchoring and adjustment heuristic, how it relates to juror decision making and the cognitive processes behind said heuristic will be presented. Finally, the literature review will outline previous research on the effects that the Not Proven verdict may have on juror decision making. Once the literature review has been presented, the current study and its aims will be outlined.

5.1.1. Context.

The legal system developed the remit of providing justice and fairness to society (Criminal Justice System, 2002) in order to stop chaos and anarchy (Chambliss & Seidman, 1971). However, this remit derived out of tradition, social norms and evolution (Basu, 2006) rather than what was actually occurring within the mind (i.e., biases and fallacies; Tversky & Kahneman, 1974). For instance, morally, every individual should be given the right to a fair trial and, ethically, every defendant should be treated as innocent until proven Guilty (Ramsey & Frank, 2007), but unconscious biases in jurors may prevent the legal systems remit of justice and fairness from being met.

The legal system and the public may be confident that the legal system does provide fairness and justice to society, however. They may argue that the legal system is primed so that everyone is treated fairly, and justice is always reached. Nevertheless, a great deal of research has shown that pre-existing biases (e.g., racial biases), initial impressions (i.e., anchors), and decision making environments (such as number of options available) all have an effect on juror decision making outcomes (Epley & Gilovich, 2006; Hope et al., 2008; Maeder, Yamamoto, & Saliba, 2015), which suggests that jurors may not be rational agents, and that a number of extra-legal factors are impeding on the legal systems

ability to deliver fairness and justice to society. Therefore, if pre-existing biases, initial impressions, and the number of legal options available are impinging on the moral pillars of fairness and justice, is the legal system really suited for its remit to society?

Some people may argue, however, that injustices are infrequent in relation to the number of accurate legal judgments made (Runciman, 1993), thus suggesting that the legal system is well suited for its remit to society. Naughton (2003) would disagree though, he suggested that there might be more injustices occurring than the royal commission would like to admit. In addition, victims of injustice that are known to the royal commission and the public have been shown to have a decreased quality of life (Ford, 1998 cited in Naughton, 2003), as individuals who have been wrongly convicted as drink drivers have lost assets, had mental breakdowns and even attempted suicide (Ford, 1998 cited in Naughton, 2003). Therefore, even if the number of injustices that does occur is small, these small numbers can still cause considerable discomfort to individuals.

In addition, even if pre-existing biases, legal system traditions, and initial impressions allow an accurate decision to be reached, if these extraneous factors impinge on the fairness of a trial or the justice that the legal system is required to uphold, then the whole system has failed (Ramsey, & Frank, 2007; Runciman, 1993). The success of the legal system, therefore, should not be measured through the number of miscarriages of justice that occur, and rather it should be measured through the fairness of the trial by jury process. It is of the utmost importance that scientific enquiry into the influences that biases and fallacies have within the legal system is continued, thus ensuring that the legal system is striving towards justice and fairness (Criminal Justice System, 2002).

In summary, extra-legal factors such as pre-trial biases, cognitive short cuts, and additional verdicts may impinge on the fairness of the legal system and the trial by jury process through influencing juror perceptions of guilt. Therefore, the current chapter will

study the effects that these extra-legal factors may have on juror perceptions of guilty and the verdicts they choose. The next section will present relevant research on the effects that pre-trial biases may have on juror decision making.

5.1.2. Pre-trial biases and their influence upon juror decision making.

Juror judgments can be biased by extraneous factors, such as previous experience of fictional forensic and legal television shows, a victim's gender and a victim attractiveness (Maeder et al., 2015; Tyler, 2006; Williams, Demuth, & Holcomb, 2007). Previous research has shown that initial biases, and/or attitudes, can affect and predict legal outcomes: verdicts, sentence recommendations and other legal decisions (Estrada-Reynolds et al., 2015). Pre-trial biases are investigated because they may make the legal system fairer, as biased jurors can be filtered out in certain jurisdictions using practices such as Voir Dire (pre-trial juror selection; Smith & Bull, 2014). Many models of juror decision making, such as the information integration model (Ostrom et al., 1978), Bayesian models (Marshall & Wise, 1975), and the Story Model (Pennington & Hastie, 1986, 1992), have incorporated prior beliefs within them (Lecci & Myers, 2008), as prior beliefs are well cited as having an impact on final juror judgments (Lecci & Myers, 2008). Nevertheless, previous research has not investigated the impact that biases can have on jurors within a three-verdict system, and a limited amount of research has investigated the influence of pre-trial biases within a UK juror setting, thus reducing the external validity of these pre-trial biases.

Previous research has found, however, that several pre-existing biases can be used to forecast the verdicts of jurors (Lecci & Myers, 2009). Examples of these biases include: the attitude that non-white defendants are guilty (racial bias); if someone commits one act of criminality they will always be a criminal (innate criminality); poor people are more

likely to be imprisoned (social injustice); defence lawyers are too relaxed at defending guilty clients (cynicism towards the defence); police do not lie, criminals do (system confidence); and that the ends justify the means in relation to convictions (conviction proneness; Lecci & Myers, 2008, 2009). All of the biases mentioned are constructs within the pre-trial juror attitudes questionnaire (PJAQ), which is a 29-item inventory (Lecci, & Myers, 2009). The PJAQ measures attitudes and beliefs in jurors that existed before the trial commenced, the inventory has a good forecasting ability over legal outcomes, as 21% of the variance of verdict tendencies (pre-deliberation) can be accounted for by responses given on the PJAQ (Lecci, & Myers, 2008, 2009). In addition, Estrada-Reynolds et al. (2015) used the PJAQ to categorise participants into groups according to their pre-trial biases (pro-prosecution, neutral and pro-defence). They found that pre-trial biases could be used to predict sentence recommendations in a death penalty case, with the pro-prosecution group giving higher sentence recommendations than the other two groups, and the pro-defence group giving lower sentence recommendations when compared to the other groups.

Another inventory is the 17-item juror bias scale (JBS) that consists of two constructs: 1) the probability of commission; and, 2) reasonable doubt (Kassin & Wrightsman, 1983). The probability of commission construct measures prior beliefs and attitudes surrounding evidence, as this highlights how guilty the juror may perceive the defendant to be (similar to Bayesian analysis), nine items were found to adequately measure this construct (Kassin & Wrightsman, 1983). Reasonable doubt, which is constructed through eight items, measures how certain the juror needs to be before convicting (Kassin & Wrightsman, 1983). Scores on the JBS can vary from 17 to 85, with high scores indicating a prosecution bias, and low scores highlighting a defence bias. Lecci and Myers (2009) found that the scale accounted for 11.6% of the variance in pre-deliberation verdicts and 6.1% of the variance in post-deliberation verdicts, which suggests that that the PJAQ is a more

adequate predictive tool. In addition, Lecci and Myers (2009) found that when controlling for the JBS, the PJAQ predicted an additional 9.6% of the variance in pre-deliberation verdicts and a further 9% of the variance in post-deliberation verdicts. The PJAQ inventory was also found to predict another 7.6% of the variance in verdict reversals once the JBS was controlled for. One criticism of PJAQ, however, is that the questions in it may prime biases in mock jurors (Mobely, 2007). A second criticism relates to how honest mock jurors will be when answering questions relating to controversial topics, such as racial biases (Guglielmi, 1999).

These pre-trial biases may skew starting points causing an asymmetrical effect on decision making process of jurors. Therefore, prosecution biased individuals may start with a higher starting point than defence biased jurors, and these initial assumptions of guilt may then act as anchors that influence the interpretations of future piece of evidence (Estrada-Reynolds et al., 2015; Tversky & Kahneman, 1974). Biases in relation to the prior points of jurors may also allow the favoured verdict/threshold to be reached first, as less information integration is needed to cross said threshold (Ratcliff & Smith, 2004). Further, pre-trial biases may promote confirmation bias and evidence distortion, and this may explain why pre-trial biases can be used to predict verdicts (Ask, et al., 2008; Estrada-Reynolds et al., 2015), as evidence interpretation may act as a mediator between the Verdict Given and the pre-trial bias.

The forecasting ability of pre-trial biases can be compromised, however, when evidence in a case is strong (De La Fuente et al., 2003). When strong evidence is provided, pre-trial biases may be attenuated, and when weak evidence is presented, pre-trial biases may be exaggerated (De La Fuente et al., 2003; Kaplan & Miller, 1978). De La Fuente et al. (2003) found that the JBS was a significant predictor of verdicts when the evidence presented was not conclusive, but it was not a significant predictor of verdicts when the

evidence presented by the prosecution was strong. Furthermore, if strong evidence is presented, the verdict a juror gives may arise from the strength of the evidence rather than their pre-trial biases (De La Fuente et al., 2003). It could be argued then, that strong pieces of evidence presented early in a trial may act as an anchor (Orr & Guthrie, 2005) that attenuates the influence of pre-trial biases.

Another attitudinal inventory that has been shown to have some forecasting ability over juror verdicts is the Forensic Evidence Evaluation Bias Scale (FEEBS; Smith & Bull, 2014). FEEBS measures biases in relation to forensic evidence interpretation, this then allows said inventory to predict evidence perception; and, indirectly, verdicts (Smith & Bull, 2014). FEEBS was found to have two sub-scales: pro-prosecution and pro-defence. Individuals who were biased towards pro-prosecution forensic evidence interpreted weak DNA evidence as having a "*higher probative value*" (Smith & Bull, 2014, p.812) than their pro-defence counterparts. Smith and Bull (2014) found that in cases where weak DNA evidence was presented, a pro-prosecution bias partially forecasted how strong the forensic evidence was seen to be; both the pro-prosecution bias and the perception of forensic evidence allowed the likelihood of guilt attached to the defendant to be explained. Pre-existing biases and attitudes, therefore, play a role in both how a verdict is reached and evidence interpretation.

In summary, pre-trial biases may influence how jurors perceive the evidence and the defendant. However, no research has investigated the influence that pre-trial biases may have within the Scottish legal system, and a limited amount of research has been conducted on pre-trial biases within a UK juror setting, thus limiting the ability to generalise the influence of these pre-trial biases to both of these systems. The next section will investigate how evidence presented early in a trial may also influence how jurors perceive the defendant.

5.1.3. The anchoring and adjustment heuristic and its influence on juror decision making.

Tversky and Kahneman (1974) were the first to study the anchoring and adjustment heuristic, which has since been widely investigated in many decision making environments – from clinical settings (Murray & Thomson, 2010) to the civil court (Greene & Bornstein, 2013). This heuristic occurs because initial pieces of information (normally numerical values) are used as anchors, and decision makers adjust from these anchors inefficiently when making decisions (Murray & Thomson, 2010). According to normative models, the anchoring and adjustment heuristic leads to a fallacy, as novel cues should be integrated independently within the decision making process (Murray & Thomson, 2010). In addition, adjustment is likely to be biased by the initial anchor (Tversky & Kahneman, 1974), thus meaning that it is unlikely that a fair and balanced prediction/decision will be reached. The impact that the first piece of information can have (known as the primacy effect) on cognitive tasks is well cited in the literature (Pennington & Hastie, 1986).

It was suggested by Tversky and Kahneman (1974) that an initial anchor could have an impact on reasoning because of three possible explanations: the availability heuristic (i.e., the ease at which an anchor comes to mind), anchors in the environments (numbers given in experiments) and/or the processing of information. For fuller description of Tversky and Kahneman's (1974) experiment studying the anchoring and adjustment heuristic, please refer back to Chapter Two's section '2.1.6 Heuristics and biases' within the current thesis.

Orr and Guthrie (2005) have suggested that experience and information of high quality decreases the influence of the anchoring and adjustment heuristic, indicating that using professional jurors and only using valid pieces of evidence in court may help to attenuate

anchoring within in the court room. Biological (e.g., valid information; Goldhill, 2014, Heller, 2006) evidence, however, is not always presented in a trial, and it is unlikely that the legal system will reform to utilising professional jurors; especially since expertise only reduced the correlation between the initial anchor and the final estimate by a marginal value (0.50 to 0.37; Orr & Guthrie, 2005). In addition, a review by Murray and Thomson (2010) found that clinical experts were still vulnerable to the anchoring and adjustment heuristic. For instance, Murray and Thomson (2010) suggested that clinicians might form too high an anchor, based on previous experiences and information, when making violence risk assessments. This initial anchor is then weighted disproportionately in comparison to novel information, thus meaning that inefficient adjustments from the initial inclination of the clinician occur (Borum, Otto, & Golding, 1993), which can lead to inaccurate and irrational judgments (Tversky & Kahneman, 1974).

Previous research has shown that the anchoring and adjustment heuristic also has an impact within the legal system. Englich et al. (2005) found that defence attorney sentence recommendations are anchored by the prosecution's recommendations, which works against the logic that the defence should follow the prosecution to balance the argument (Englich et al., 2005). Chapman and Bornstein (1996) found that the strength of an anchor had an impact on the liability judgments made in civil court cases, with jurors who were shown strong (in comparison to weak) anchors being more likely to perceive the defendant as liable. The jurors who were shown the strong anchors also perceived the defendant to be more to blame for the plaintiff's injuries in comparison to jurors who were shown the weak anchor. In addition, the anchoring and adjustment heuristic has been shown to influence both judges and jurors when estimating financial awards in civil cases (Greene & Bornstein, 2003, 2013; Guthrie et al., 2002; Orr & Guthrie, 2005). In summary, the anchoring and adjustment heuristic influences a number of legal decision makers and

actors. Next theories that explain why the anchoring and adjustment heuristic occurs will be discussed.

Previous researchers have attempted to explain the processes behind the anchoring and adjustment heuristic, and this has led to four potential explanations: 1) the insufficient evidence theory; 2) the numeric priming theory; 3) the social implication theory; and, 4) the information salience theory (Orr & Guthrie, 2005). The insufficient evidence theory suggests that this cognitive short cut occurs because of both a lack of cognitive resources and an ambiguous decision environment (Orr & Guthrie, 2005). Decreasing ambiguity and increasing cognitive effort does not attenuate the anchoring and adjustment heuristic, however (Northcraft & Neale, 1987).

The numeric priming theory proposes that anchoring influences the rest of the decision making process through priming, as numbers (irrelevant of how important they are to the current task) influence outcomes (Orr & Guthrie, 2005). Nevertheless, Strack and Mussweiler (1997) found that anchors given to participants in relation to questions relating to the Brandenburg gate (i.e., whether the gate was higher or lower than 150 metres?) influenced height estimates more than width, this should not have occurred if the numeric priming theory was responsible for anchoring.

Social implication theory proposes that anchors influence decision makers because they believe that there must be some value in the anchor (Orr & Guthrie, 2005). Participants may ask themselves, "*Why has this number been provided, if it is not useful to me?*" This theory, however, cannot explain why anchors are used when the decision maker may doubt the person who provides the anchor (i.e., a prosecution lawyer who suggests a sentence recommendation; Orr & Guthrie, 2005).

Information accessibility theory suggests that anchors contain some meaning and act as hypotheses that guide our judgments (Orr & Guthrie, 2005). Whether we accept or reject

this anchor does not really matter, the acceptance of the hypothesis at one point in the decision making process will cause the final estimate to be biased (Orr & Guthrie, 2005). Nevertheless, there is one problem with this theory, certain anchors that are provided randomly (like from a spin board) have no meaning in relation to decision tasks (i.e., how many African countries are there in the U.N.). In short, none of the theories above can adequately explain the anchoring and adjustment heuristic.

Another supplementary theory comes from Epley and Gilovich (2006), they stated that individuals use the anchoring and adjustment heuristic when the decision making environment is uncertain. In self-generated anchoring experiments (where the anchor is not provided by the researcher) individuals know their anchor is incorrect, yet may think that their anchor is close to the correct answer (Epley & Gilovich, 2006). Therefore, adjustment from their anchor after more information has been presented is an attempt to increase their chances of making a correct decision (Epley & Gilovich, 2006).

Epley and Gilovich (2006) proposed that adjustment occurs until a satisficing level is reached, which links well with the earlier discussions on thresholds. These authors claimed that the initial anchor might come from the first impression, and that adjustment may occur after each new piece of information until a satisficing value is reached; adjustment will continue if no satisficing value is reached (Epley & Gilovich, 2006). Epley and Gilovich's (2006) research links with the results found in both Chapter three and Four, as said chapters found evidence to suggest that decision makers start from a prior point of guilt and then integrate information (or adjust) until a satisficing value/threshold is reached. In addition, in Chapter Four, it was found that both evidence types had higher likelihoods post-threshold for Guilty verdicts in comparison to pre-threshold, thus suggesting that adjustment decreases once a satisficing value (symbolised by reaching a threshold) is reached; anchors may therefore influence estimates of guilt.

In addition, Epley and Gilovich (2006) found that cognitive load influenced adjustment, as individuals with low, in comparison to high, cognitive load, who were sober (in comparison to individuals who had consumed alcohol) and who were high (rather than low) on the Need for Cognition scale had a larger adjustment from their respective anchors (Epley & Gilovich, 2006). The reason for this is because the less cognitive effort one is motivated to expend, willing to give or has on a certain task, then the less likely one is to adjust rationally; thus, promoting frugal decision making (Epley & Gilovich, 2006; Simon, 1956).

Scientific evidence, legalese, and the possibility of multiple chargers (i.e., a defendant facing charges for both homicide and armed robbery) makes the courtroom a complex place for a juror (Greene & Loftus, 1985; Schklar & Diamond, 1999; Severance & Loftus, 1982). This complexity, combined with a lack of comprehension concerning legalese, may reduce the cognitive effort that jurors are able/willing to give, which might promote minimal adjustment from initial evidence anchors (Epley & Gilovich, 2006; Simon, 1956).

In summary, the current section has highlighted that jurors may be likely to use evidence anchors (see Chapman & Bornstein, 1996) to guide their inferences of guilt within a novel courtroom environment, and that complex legal proceedings may attenuate adjustment from said anchor (Epley & Gilovich, 2006). Therefore, initial evidence anchors may influence how jurors perceive the defendant and the final verdict that is given. In tradition with bounded rationality, the next section will move away from internal cognitive processes, and will focus on how the environment influences juror decision making.

5.1.4. Verdicts systems (two vs. three).

Chapter Three investigated the decision making process of jurors within a three-verdict system, and Chapter Four investigated the decision making process of jurors in a two-verdict system. Neither of the chapters have investigated how this difference in legal environment might have an impact on juror decision making though. Therefore, the current section aims to discuss previous research surrounding the impact that the inclusion of the Not Proven verdict might have upon juror decision making.

Hope et al. (2008) found that jurors in a three-verdict system (i.e., Not Proven, Guilty, and Not Guilty) were less likely to give a Not Guilty verdict in comparison to jurors in a two-verdict system (i.e., Guilty or Not Guilty). The estimate of guilt given for Not Proven verdicts, however, was not significantly higher (Not Proven M = 52.4%) than the estimates given for Not Guilty verdicts in either of the verdict systems (Not Guilty, two-verdict M = 42.4%; and, three-verdict M = 42.5%). This highlights that the Not Proven estimate of guilt given in Hope et al.'s (2008) research was large enough to justify giving a Not Proven verdict over a Not Guilty verdict, but was not large enough to allow a Guilty verdict to be given.

In addition, Hope et al. (2008) demonstrated that irrespective of verdict or evidence weight, verdicts made in the three-verdict system allowed the mock jurors to feel more confident than their binary verdict counterparts. Confidence does not always equal accuracy, however (Hall et al., 2007). Hope et al. (2008) also found that the different verdict systems did not have a significant impact on the juror's perception of guilt surrounding the defendant. However, the perception of guilt was only measured at the end of a trial and did not measure the overall belief of guilt summed from perception of guilt ratings given at each of the different pieces of evidence, which would have been more sensitive to differences in perception of guilt.

Bhatia (2014) found that if a third response is available which supports one of the original responses but not the other, then the option supported by the additional third response will be the response most likely to be chosen. For example, if one group of participants are asked which packet of crisps contained the highest fat content between a 150g bag of Walkers, a 150g bag of Golden Wonder, or a 100g bag of Walkers, and a second group is asked which packet of crisps contained the highest fat content between a 150g bag of Walkers and a 150g bag of Golden Wonder, the first group would be more likely to choose the 150g bag of Walkers in comparison to the second group. Bhatia (2014) has found this result consistently using his own tests and examples.

Bhatia (2014) suggested that asymmetric dominance could explain these results. Asymmetric dominance essentially means that if an additional third option is added, which is recessive in one factor to one of the original options but similar to that same option in regard to another factor, and different to an alternative option, it will allow the similar yet dominant option to be considered the leading choice. In the crisp example above, the 150g bag of Walkers has a higher chance of being picked in the three-option condition in comparison to the two-option condition, as the additional third choice is made by the same company but is recessive in terms of weight. This research showed that the introduction of an extra option could cause differences in relation to which option is picked most frequently.

If Bhatia's (2014) and Hope et al.'s (2008) findings are taken together, an interesting conclusion can be drawn: that the introduction of a third option influences which option, out of an original binary set of options, is mostly likely to be chosen. Asymmetrical dominance, however, cannot explain the results found in Hope et al.'s (2008) study, as the Not Proven verdict is similar to the Not Guilty verdict as both are acquittal options, but is also recessive to the Not Guilty verdict because it is not an outright acquittal.

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Nevertheless, the frequency of Not Guilty verdicts did not increase in the three-verdict system in comparison to the two-verdict system, thus showing that asymmetrical dominance may not fit in well within a juror setting.

Smithson et al. (2007) conducted a similar experiment to Hope et al. (2008). Their first study investigated how the introduction of a third verdict may affect the verdict chosen, the belief of guilt and the difficulty of the decision in both a civil case surrounding negligence and a criminal trial focussed on murder. A significant association between the verdict that was given and the number of verdicts that were available was found, fewer Not Guilty and Guilty verdicts (to a lesser extent) were given in the three-verdict condition in comparison to the two-verdict condition; and, when the Not Proven verdict was available, significantly more guilty verdicts were given in comparison to not guilty verdicts (Smithson et al., 2007). Once again, this suggests that asymmetric dominance may not apply to the courtroom. Middling beliefs of guilt led to Not Proven verdicts, causing the beliefs of guilt associated with Not Guilty verdicts to be reduced in both trial types (Smithson et al., 2007).

Smithson et al.'s (2007) second study replicated study one, but added Manslaughter as an additional potential verdict in one of the conditions. Within the study, there were three conditions: 1) Anglo-American two-verdict system; 2) the Scottish three-verdict system; and 3) a three-verdict system where the third verdict was the Manslaughter verdict (Smithson et al., 2007). It was found that Not Proven and Manslaughter verdicts seemed to push participants away from giving Not Guilty and Guilty verdicts, and both Not Proven and Manslaughter verdicts did not differ significantly in terms of similarity ratings when contrasted with Guilty verdicts. Their third study focussed on the similarities between each of the verdicts (Guilty, Not Guilty, Manslaughter and Not Proven), and found that Manslaughter verdicts were more similar to Guilty verdicts and that Not

Proven verdicts were more similar to Not Guilty verdicts (Smithson et al., 2007). In addition, Smithson et al. (2007) found that Manslaughter and Guilty verdicts did not differ significantly in relation to belief of guilt ratings. Not Proven verdicts had a significantly lower belief of guilt than Guilty verdicts, and Not Guilty verdicts gave a significantly lower belief of guilt than Not Proven verdicts. Decisions that led to Not Proven verdicts were also seen as being more difficult in comparison to decisions that led to other verdicts. Smithson et al.'s (2007) research, therefore, suggests that the introduction of a third verdict has an impact on the verdict most likely to be chosen, the difficulty of the task, and does not deter jurors away from Guilty verdicts. Their research, however, lacked a theoretical underpinning and used an Australian sample who may not be accustomed to the Not Proven verdict.

The current thesis has discussed the impact that a three-verdict system may have on jurors, but has not yet examined whether or not a three-verdict system would be beneficial. Jackson (1998) used discursive analysis and semiotic analysis (the study of symbols) to show that the aims of a juror may differ in comparison to the legal system, and that the inclusion of the Not Proven verdict may change the meaning of the Not Guilty verdict. First, the layperson may see the jury as ontological fact finders, whereas legal professionals may see jurors as cognitive processors who use information to prove a certain verdict (Jackson 1998). Therefore, the Not Guilty verdict may mean one thing for a lawyer (that proof was lacking) and another for a juror (that the truth surrounding the innocence of the defendant has been discovered).

In addition, Jackson (1998) suggests that the definition of the Anglo-American verdicts may differ when another verdict is available. When a Guilty verdict is given in a two-verdict system, it could be said that the information supplied allowed guilt to be proven beyond reasonable doubt. Conversely, Not Guilty verdicts in a two-verdict system can be

given either when a jury believes that the person was truly innocent, or when a jury believes that the defendant was truly Guilty, but the evidence was lacking in relation to a conviction (Jackson, 1998). This would then mean that acquitted individuals who are truly innocent might face social sanctions as the public may think that they were actually Guilty.

One way to counter the above criticism of Not Guilty verdicts in a two-verdict system is to introduce the Not Proven verdict. The introduction of the Not Proven verdict would mean that individuals who have been given a Not Guilty verdict would face no social and no legal sanctions, as a jury of their peers have shown that they thought that the defendant's innocence has been proven (Jackson 1998). Therefore, the definition of the Not Guilty verdict is much more potent in the Scottish three-verdict system because juries have to, consciously, bypass both a Not Proven verdict to give it. Individuals who are given the Not Proven verdict will be free from legal sanctions, yet may still face social sanctions due to the lack of confidence from the jury in relation to their innocence. The definition of the Guilty verdict does not differ between either of the verdict systems (Jackson 1998).

The inclusion of the Not Proven verdict makes the Scottish system a more logical option in comparison to its Anglo-American counterpart for assessing the guilt of a defendant (Broadbridge, 2009). One problem with the Not Proven verdict, however, is that the public may wrongly think that an innocent defendant who has been given the Not Proven verdict is Guilty (Jackson, 1998); thus, the Not Proven verdict does not solve the problems of the Not Guilty verdict, it simply diverts the issue. In addition, Scottish jurors may confuse Not Proven verdicts with Not Guilty verdicts because of the similarities in legal outcomes, and this may cause some innocent individuals to suffer unwarranted social

sanctions. The Not Proven verdict is also paradoxical because it suggests that evidence can provide enough proof for social sanctions, yet not enough for legal sanctions.

 Bhatia (2014), Hope et al. (2008) and Smithson et al. (2007) suggest that the introduction of an additional, middle option has an impact on which verdict/option is chosen. These results taken together propose that jurors, and general decision makers, may be violating the regularity principle because if a Not Guilty verdict can be given in an initial choice set, then the same verdict should be given when the same (or similar) evidence is presented, regardless of the number of verdicts available (Hope et al., 2008). In addition, Hope et al.'s (2008) study showed that the perception of guilt surrounding a defendant does not change across the verdict systems, which also highlights that jurors may be deviating from Normative models, such as the Bayesian Model (Kahan, 2015). This is because normative models would predict that a similar amount of information integration should lead to the same verdict being chosen (Kahan, 2015), whereas Hope et al.'s (2008) study found that the verdict system influenced the verdict chosen but not the perception of guilt surrounding the defendant given.

In summary, the current section has highlighted that the introduction of an additional option, such as the Not Proven verdict, can have an impact on verdict choice (Bhatia, 2014; Hope et al., 2008; Jackson, 1998). In addition, Hope et al. (2008) suggested that jurors violate the regularity principle, as the likelihood of choosing a Not Guilty verdict in an initial choice set (i.e., the two-verdict system) should not be altered by the inclusion of the Not Proven verdict. Hope et al. (2008) also found that estimates of guilt surrounding the defendant did not differ significantly across the two-verdict systems, which further highlights that jurors may be deviating from rational norms. Therefore, the current research will test whether or not jurors deviate from rational norms by comparing belief

of guilt ratings and the verdicts given across the Anglo-American system and the Scottish system. The next section will outline the current study's aims and hypotheses.

5.1.5. Current study.

Three main areas of research were investigated in the current chapter's literature review: 1) pre-trial biases; 2) anchoring and adjustment; and 3) the Not Proven verdict. Each of these areas of research will now be discussed in relation to the current study's research aims and hypotheses.

5.1.5.1. *Pre-trial biases.*

Lecci and Myers (2009) highlighted that pre-trial biases can predict the verdicts given by jurors, and Estrada-Reynolds et al. (2015) showed that by categorising individuals into groups according to their pre-trial biases, evidence of information distortion upon sentence recommendations could be observed, with pro-prosecution biased individuals being more likely to sentence defendants to death in comparison to pro-defence biased individuals. However, the PJAQ used by both Lecci and Myers (2009) and Estrada-Reynolds et al. (2015) has not been investigated within UK courts, and jurors do not have the ability to give sentence recommendations, making the outcomes of these studies interesting but limited in terms of utility when considering the Scottish and UK legal system. Therefore, the current study aims to investigate whether or not pre-trial biases influence juror perceptions of guilt and the verdicts they choose within a UK and Scottish court setting. In addition, the previous chapter hinted that pre-trial biases may have an impact on jurors decision making, thus the current chapter was designed to test this explicitly.

The hypotheses for this section were:

1. There will be a significant main effect of pre-trial bias across the total belief of guilt score.

2. Pre-trial bias will be significantly associated with the Verdict Given.

To test the total belief of guilt score (perception of guilt) across the pre-trial biases, the PJAQ was used to categorise jurors into three different types of biases: pro-prosecution, pro-defence, and neutral. If significant differences are found between the pre-trial biases (mentioned above) across the dependent variable of total belief of guilt score, then the hypothesis can be accepted, and support for the belief that pre-trial biases have an impact on how defendants are perceived will be found. Research from Estrada-Reynolds et al. (2015) and Lecci and Myers (2009) suggests that pro-prosecution biased individuals will give significantly higher total belief of guilt scores in comparison to the other two groups, and that pro-defence biased individuals will give significantly lower total belief of guilt scores in comparison to the other two groups.

To test the association between the Verdict Given and pre-trial bias, the pre-trial bias categories mentioned above were used. In regard to the Verdict Given variable, in one condition participants could give one of three-verdicts (Guilty, Not Guilty or Not Proven) and in the other condition, participants could give one of two-verdicts (Guilty or Not Guilty). If a significant association between the Verdict Given and pre-trial bias is found, the second hypothesis can be supported. Research from Estrada-Reynolds et al. (2015) and Lecci and Myers (2009) suggests that a significant association between the Verdict Given and pre-trial bias will be found, with pro-prosecution biased individuals giving more Guilty verdicts than the other two groups, and pro-defence biased individuals giving more Not Guilty verdicts than the other two groups.

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5.1.5.2. *Anchoring and adjustment.*

Tversky and Kahneman's (1974) research investigations have highlighted that the anchoring and adjustment heuristic can bias decisions. Previous researchers have found that the anchoring and adjustment heuristic can be applied to courtroom. For instance, Englich et al. (2005) found that prosecution sentence recommendations anchored the sentence recommendations of the defence, and Chapman and Bornstein (1996) found that evidence anchors (strong versus weak) anchored liability ratings in civil court jurors. In addition, the anchoring and adjustment heuristic has also been shown to influence both judges and jurors when estimating financial awards in civil cases (Guthrie et al., 2002; Orr & Guthrie, 2005). However, no research has investigated the influence that evidence anchors might have on juror perceptions of guilt and verdict choice in the criminal courtroom; and the current study aims to fill this gap. In addition, the current investigation has practical as well as theoretical implications: practically, it may help lawyers when they are deciding where to place strong pieces of evidence; and theoretically, it may highlight that anchors can be more than just numerical values.

The hypotheses for this section were:

3. Initial anchors will have a significant main effect on the total belief of guilt score.

4. The initial anchor will be significantly associated with the Verdict Given.

To test the belief of guilt score across the different anchors, a pilot was conducted (see Appendix A) to determine two pieces of evidence suitable enough to be used as strong and weak anchors, respectively; DNA evidence was used as the strong anchor and secondary confessions were used as the weak anchor. If significant differences are found between the anchors (mentioned above) across the dependent variable of total belief of guilt score, then the third hypothesis in this chapter can be accepted, and support for the

belief that anchors have an impact on how defendants are perceived will be found. Chapman and Bornstein (1996) used strong and weak anchors in a civil court case and found that jurors who were given the strong anchor blamed the defendant more for the plaintiff's injuries than jurors who were given the weak anchor. Therefore, it is expected that strong anchors will cause a significantly higher total belief of guilt score to be produced in comparison to weak anchors.

To test the association between the Verdict Given and the initial anchor, the same anchors mentioned above were used; also, see '5.1.5.1. Pre-trial biases' for description of the Verdict Given variable. If a significant association between the Verdict Given and the initial anchor is found, then the fourth hypothesis in this chapter will be retained. Chapman and Bornstein (1996) found that jurors who were given the strong anchor were more likely to think that the defendant was liable in comparison to jurors who were given the weak anchor. Consequently, it is expected that a significant association between the initial anchor and Verdict Given will be found, with the strong anchor giving with more Guilty verdicts than the weak anchor.

5.1.5.3.   *Verdicts available.*

Research from Hope et al. (2008) and Smithson et al. (2007) has shown that the inclusion of the Not Proven verdict has an impact on the verdict chosen. Hope et al.'s (2008) research used transcripts where the defendants were either charged with sexual or physical assault. Smithson et al.'s (2007) research utilised an Australian sample that may not be as accustomed to the Not Proven verdict as a Scottish sample. The current research, therefore, aims to investigate the influence that the three-verdict system in comparison to the two-verdict system may have on verdict choice in a Scottish sample using homicide vignettes.

The hypothesis for this section was:

5. Significantly fewer Not Guilty verdicts will be given in the three-verdict condition in comparison to the two-verdict condition.

To test whether or not fewer Not Guilty verdicts would be given in a three-verdict system in comparison to a two-verdict system, the number of Not Guilty verdicts given when the Not Proven verdict was available was compared to the number of Not Guilty verdicts given when the Not proven verdict was not available. It is expected based on research from Hope et al. (2008) and Smithson et al. (2007) that not guilty verdicts will be chosen significantly fewer times in the three-verdict condition in comparison to the two-verdict condition. If this is found, then hypothesis five will be retained. In addition, the current study has one research aim, which is to test whether or not any differences in relation to the total belief of guilt score exist between the different verdict systems. This research aim was developed to test if jurors are deviating from rational norms.

5.2. Method

5.2.1. Design.

This quasi-experiment adopted a 3 x 2 x 2 mixed factorial design with the within-subjects factors being the initial anchor (weak vs. strong) and the number of verdicts available (two vs. three), and the between-subjects factor being pre-trial bias (pro-prosecution, pro-defence and neutral) as measured on the PJAQ. The first dependent measure used in the current study was the total belief of guilt score and the second dependent measure used was the Verdict Given variable, which varied depending on the number of verdicts available condition.

5.2.1.1.   *Counterbalancing of vignettes and factors.*

Participants heard two vignettes in the current investigation; these vignettes were counterbalanced across participants. The vignettes also had two different orderings to reduce potential order effects: 1) where eyewitness testimony was the second piece of prosecution evidence and expert witness testimony was the third piece of prosecution evidence; and 2) where the eyewitness testimony was the third piece of prosecution evidence and expert witness testimony was the second piece of prosecution evidence shown. These different orderings were also counterbalanced across participants. In addition, each of the within-subjects factors (initial anchor and number of verdicts available) were counterbalanced over the sample of participants. In other words, half of the participants were provided with the strong anchor in their first vignette and the weak anchor in their second vignette, and the other half of participants were provided with the weak anchor in their first vignette and the strong anchor in their second vignette; the anchor condition that participants were placed in first was randomly assigned. In relation to the number of verdicts available factor, half of the participants could give one of three-verdicts in the first vignette they heard (Guilty, Not Guilty or Not Proven) and one of two-verdicts in the second vignette they heard (Guilty or Not Guilty), and the other half of participants could one of two-verdicts in the first vignette they heard and one of three-verdicts in the second vignette they heard; the number of verdicts available condition that participants were placed in first was randomly assigned. The order of the presentation of the PJAQ was also counterbalanced, with half of the participants completing it before the vignettes, and the rest completing it post-vignettes. Please see Table 11 for the number of participants that were placed in each of the different counterbalancing orders.

Table 11

Counterbalancing table.

Counterbalancing Orders	Participant Number
The Vignette Order:	
Vignette One first followed by Vignette Two	64
Vignette Two first followed by Vignette One	64
Total	128
The Expert testimony and Eyewitness Testimony Order	
Eyewitness Testimony first followed by Expert Testimony	64
Expert Testimony first followed by Eyewitness Testimony	64
Total	128
The Anchor Order:	
Strong Anchor first followed by Weak Anchor	64
Weak Anchor first followed by Strong Anchor	64
Total	128
The Number of Verdicts Available Order:	
Three-Verdict Condition first followed by Two-Verdict Condition	64
Two-Verdict Condition first followed by Three-Verdict Condition	64
Total	128
The PJAQ and the Vignettes Order:	
The Vignettes first followed by the PJAQ	64
The PJAQ first followed by the Vignettes	64
Total	128

5.2.2. Participant.

The current study included 128 participants (female = 98). Participants were aged between 18 and 61 years old ($M = 24.93$, $SD = 8.02$). In this sample, 114 of the participants were students, the sample also consisted of other occupations, including but not limited to: academics, semi-skilled workers and the unemployed. Only two inclusion/exclusion criteria were applied:

- Are you eligible to vote?

- And, are you eligible to be on a jury?

Participants were recruited via opportunistic sampling through placing advertisements on a number of websites (e.g., Gumtree, Call for Participants, and Craigslist, Facebook and Twitter).

5.2.3. Materials.

5.2.3.1. *The PJAQ.*

The PJAQ (Lecci & Myers, 2008) was used to group participants into three conditions: pro-prosecution, pro-defence, and neutral. Permission to use this questionnaire was given by its authors before the study began. The PJAQ is a 29-item questionnaire which is composed of six constructs: racial bias (four items); innate criminality (four items); social injustice (four items); cynicism towards the defence (seven items); system confidence (six items); and conviction proneness (five items); system confidence and innate criminality share an item. These items were rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree; Mobely, 2007), with two items being reverse scored due to wording to reduce the risk of response bias; see Table 12 for the possible minimum and maximum scores that participants could give in each of the six constructs.

Table 12

Possible maximum and minimum scores for each of the constructs within the PJAQ.

Name of Construct	Minimum	Maximum
Racial Bias	4	20
Innate Criminality	4	20
Social Injustice	4	20
Cynicism Towards the Defence	7	35
System Confidence	6	30
Conviction Proneness	5	25

Participants' scores across each of the six constructs was then summed to give a 'total bias score'. If participants gave the lowest score possible on each of the six constructs their total bias score would be 30; and, if participants gave the highest score possible on each of the six constructs their total bias score would be 125. Therefore, the total bias scale had a potential range of 30 to 125. Once all the participants had taken part, the mean total bias score was calculated. Scores one standard deviation below the mean were categorized as having a pro-defense bias; scores one standard deviation above the mean were categorized as having a pro-prosecution bias; and the remaining scores were coded as being 'neutral'; see section '5.3.1. Results from the PJAQ' to see how many participants were categorised into each of the three categories.

The PJAQ is a contemporary questionnaire and has been used in recent juror decision making studies. For instance, Estrada-Reynolds et al. (2015) used the PJAQ to separate participants into three conditions (neutral, pro-prosecution and pro-defence), aligning to the design of the current study. The PJAQ has been shown to be superior in regard to prediction in comparison to other scales, such as the JBS (Lecci & Myers, 2008, 2009), and it has been shown to have good internal validity (Lecci & Myers, 2008). Three of the questions used in the PJAQ were slightly adapted in the current study to make the PJAQ

more suited to a Scottish/UK court setting. First, a previous item of: "A defendant should be found guilty if 11 out of 12 jurors vote guilty" was changed to: "A defendant should be found guilty if a majority of 8 out of 15 jurors (in Scotland), or a unanimous decision of 8 out of 12 (in England and Wales), vote guilty" to encompass the different legal systems being used in the current investigation. Second, a previous item of: "The large number of African Americans currently in prison is an example of the innate criminality of that subgroup" was changed to: "The large number of black individuals currently in prison is an example of the innate criminality of that subgroup" as to be more representative of the sample population. Finally, a previous item of: "If the defendant committed a victimless crime, like gambling or possession of marijuana, he should never be convicted" was changed to: "If the defendant committed a victimless crime, like possession of marijuana, he should never be convicted" as gambling is legal in the UK.

5.2.3.2.   *Measure of guilt.*

Guilt was measured by asking participants to mark their belief of guilt on a visual guilt rating scale; see Figure 9.
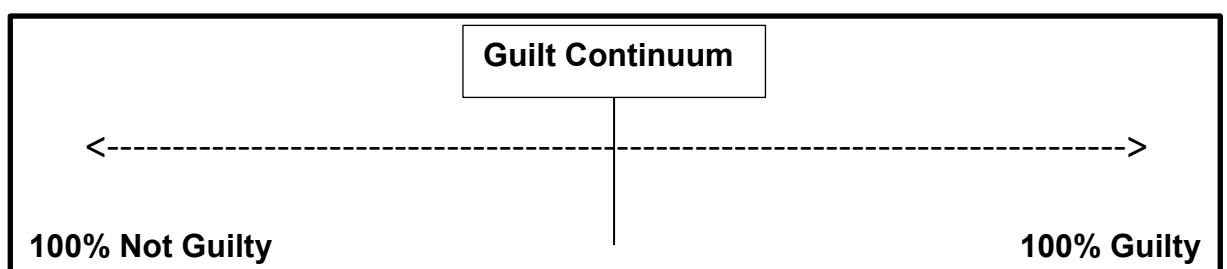
Figure 9. Guilt rating scale.

The guilt rating scale, which is a visual analogue scale, is 16 cm long; the bi-directional arrows within it are 14 cm long (each arrow spans 7cm from the centre point to the end). The far left of the guilt rating scale (marked with this arrow <) symbolises 100% Not Guilty and the far right of the guilt rating scale represents (marked with this arrow >)

100% Guilty. This scale was used so that participants could visually show how guilty they thought the defendant was, and so that the researcher could code these visual ratings of guilt into ratio data by measuring, with a ruler, how far the participants had marked their belief of guilt ratings from the Not Guilty arrow point on the far left. For example, if a participant marked their belief of guilt on the tip of the not guilty arrow, then their belief of guilt score would be zero, whereas if they marked said belief on the tip of the Guilty arrow, then their belief of guilt score would be 14. The rating of guilt score therefore had a possible range of 0-14 cm. Participants rated their belief of guilt after the opening statement, after each piece of evidence, and after each closing statement. All of these respective belief of guilt ratings were then summed to create a total belief of guilt score; this allowed the perception of guilt throughout the whole vignette to be measured. This total belief of guilt score had a potential range of 0-154; the higher this score was, the higher the belief of guilt was. Each participant gave two total belief of guilt scores, one for each of the two vignettes the participants heard.

This guilt rating scale will be used to measure guilt in the current study, in comparison the likelihood of guilt rating used in previous chapters, for three reasons: 1) because people who are not statistically trained may find likelihood of guilt ratings difficult to understand (Gigerenzer & Goldstein, 1996); 2) because the guilt rating scale had a visual marking system, which may have reduced the cognitive load of the participants (Bröder & Schiffer, 2003b), thus, possibly, allowing participants to rate their belief of guilt more efficiently; and, 3) because a study outwith this PhD, with the same research team, found similar results using the guilt rating scale (Curley, Allahverdi, MacLean, & Murray, unpublished) as have been found previously using likelihood of guilt ratings.

5.2.3.3. *Vignettes.*

5.2.3.3.1. *Development of vignettes.*

Two vignettes were developed, each with two versions to allow counterbalancing of information; see section '5.2.1.1. Counterbalancing of vignettes and factors'. The vignettes utilised in the current study were fictional, but were inspired from real life trials, and the information from these real life trials was gathered from court transcripts and newspapers. The researcher also attended a real life high court trial to make sure that the vignettes used were structured like a real life trial.

Literature on vignette development was consulted when designing the vignettes (i.e., Ashill & Yavas, 2006; Heverly et al., 1984). The two vignettes were designed to be the same length (i.e., 962 words long). Each of the vignettes were designed to contain an opening statement (130 words long for each of the vignettes) that provided context, four pieces of prosecution evidence, four pieces of defence evidence, and two closing statements (one from each stance). This vignette design was used as it worked effectively in an earlier study conducted and described in Chapter Four. The information presented in the two vignettes were similar in narrative: a female victim, a male defendant, a homicide trial, similar motives and the same evidence types were heard (e.g., DNA evidence, eyewitness testimony, expert testimony and secondary confessions). The evidence types were selected as previous researchers had used them (see Ask et al., (2008); Lemieux, (2007); Wetmore et al., (2014). The only information that differed across the vignettes were names, ages and the specific details of the evidence and opening statements to improve generalizability. The ages of the victims and defendants, however, were comparable across the vignettes. Vignettes were designed to be ambiguous, this was done by presenting prosecution evidence first and then following said evidence with a piece of evidence from the defence, which would occur in a real trial. This was designed

for two reasons: 1) because criminal court cases are inherently ambiguous, as cases which favour the defence will normally be settled outside of court, and trials that favour the prosecution will probably not reach the courtroom (Arkes, & Mellers, 2002; De La Fuente et al., 2003); and 2) because biases seem to be strengthened by ambiguous environments (Dror, 2016). Consequently, the best place to test the impact of the anchoring and adjustment heuristic and pre-trial biases would be in an ambiguous courtroom setting.

The type of evidence (DNA evidence, eyewitness testimony, expert testimony and secondary confessions; see Appendix D for experiment materials) used in the vignettes as the strong and weak anchors was established through piloting (see Appendix A). The piloting highlighted that DNA evidence was rated as significantly stronger than the other types of evidence, and that secondary confessions were rated as significantly weaker than the other types of evidence; see appendix A for more details on methodology and results of this pilot. Therefore, DNA evidence was used as the strong initial anchor and secondary confessions were used as the weak initial anchor, thus allowing the within-subjects variable of anchor to be created. Over this quasi-experiment, where participants heard two vignettes, each participant was provided with one vignette that presented a strong initial anchor and another vignette that presented a weak initial anchor. In addition, if a vignette started with a strong initial anchor, then it would end with a weak initial anchor, and vice versa. This was done to ensure that the information provided across the different versions (i.e., weak and strong anchor versions) of each vignette was the same and that the only thing that varied was the initial anchor orders. As expert testimony was rated as significantly stronger than eyewitness testimony, these pieces of evidence were also counterbalanced across both vignettes to reduce order effects. By varying the order of both the initial anchor and the second piece of prosecution evidence (eyewitness testimony vs. expert testimony) it meant that for each of the two vignettes, four different versions existed: 1) where the strong anchor was the first piece of prosecution evidence

and expert testimony was the second piece of prosecution evidence; 2) where the strong anchor was the first piece of prosecution evidence and eyewitness testimony was the second piece of prosecution evidence; 3) where the weak anchor was the first piece of prosecution evidence and expert testimony was the second piece of prosecution evidence; 4) where the weak anchor was the first piece of prosecution evidence and eyewitness testimony was the second piece of prosecution evidence. Each of these four versions was counterbalanced across the participants; please see back to section '5.2.1.1. Counterbalancing of vignettes and factors' for more information on how the anchor factor and second piece of prosecution evidence (eyewitness testimony vs. expert testimony) was counterbalanced.

5.2.3.3.2.   *Audio vignettes.*

Audio vignettes were constructed by employing a voice actor to read out the written vignettes in a quiet room at Edinburgh Napier University. Vignette one was either 5 minutes and 49 seconds long or 5 minutes and 51 seconds long, depending on the counterbalancing version of the vignette. Vignette two was either 5 minutes and 56 seconds long or 6 minutes and 2 seconds long, depending on the counterbalancing version of the vignette. Regardless of the slight time differences from editing, each version of a vignette provided the same pieces of information, and only the order of the evidence varied. The vignettes were recorded using the audio recording app *Dictaphone – Audio Recorder* on an iPhone 5. The audio recording was then edited using the software *Audacity*.

5.2.3.3.3.   Audio playback device.

The participants heard the vignettes in a quiet Psychology laboratory at Edinburgh Napier University. The audio vignettes were saved as an mp3 file, and played using the software *Windows Media Player*. The participants heard the vignettes through *Labtec Spin 95* speakers.

5.2.3.4.   Verdict judgments.

Once all the evidence had been provided in a vignette, participants were asked to give a final verdict, the verdicts that were available to them differed on the condition, thus allowing the within-subjects factor of the number of verdicts available (two-verdict system vs. three verdict system) to be created. Over this quasi-experiment, participants were presented with one vignette where they could give one of three-verdicts and another vignette where they could give one of two-verdicts; please see section '5.2.1.1. Counterbalancing of vignettes and factors' for more information on how the verdicts available factor was counterbalanced across participants. Participants were told which verdict options were available to them before starting each of the vignettes.

5.2.3.5.   Information sheet, consent form and debrief sheet.

Standardised information sheets and debrief sheets made participants aware of the exclusion/ inclusion criteria, ethical issues (such as the right to withdraw and confidentiality), and who to contact if they need additional support. In addition, the consent forms allowed participants to consent to partaking in the pilot.

5.2.4. Procedure.

Participants read the standardised information sheet and completed the consent form within a quiet room in the Psychology Laboratory at Edinburgh Napier University. Once the consent form was signed, participant filled out the demographics questionnaire. Participants were then played the opening statement for the first vignette and were asked to state an initial/prior rating of guilt by marking on the guilt rating scale (see Figure.9). They then heard the first piece of prosecution evidence, which was either a strong anchor or a weak anchor, and were asked to mark their belief of guilt rating again on another, fresh copy of the guilt rating scale. After this, participants heard the first piece of defence evidence, they were then asked to mark their belief of guilt on the guilt scale rating. This procedure of hearing evidence and giving a belief of guilt rating on the guilt rating scale was continued for the remaining six pieces of evidence (three for the prosecution and three for the defence). Once all of the evidence had been heard, the participants listened to two closing statements: one from the prosecution, which was heard first, and one from the defence. After hearing each of the closing statements, participants were asked to give their belief of guilt on the guilt rating scale. The participants were then given the following instructions from the judge: "Remember, to give a Guilty verdict you must think that the defendant was guilty beyond reasonable doubt". Finally, participants were asked to give a verdict, the number of verdicts available to them depended on the condition (two-verdict condition = Guilty or Not Guilty; three-verdict condition = Guilty, Not Guilty, or Not Proven). Half of the participants completed the PJAQ before hearing the vignettes and half after. The PJAQ was referred to as a legal questionnaire to participants, as the real title may have hinted to participants that biases were being tested. Once the first vignette was completed, participants repeated this procedure with a second vignette. Once the participants had finished, they were given a debrief sheet and were

asked to confirm that they were happy for their data to be analysed by ticking a box; no participants chose this withdrawal option.

5.2.5. Ethics.

The current study was granted ethical approval by the Research Integrity Committee in the School of Applied Sciences at Edinburgh Napier University.

5.3. Results for the Third Quasi-Experiment

This section will present an exploration of the influence that each of the factors (pre-trial bias, initial anchor and the number of verdicts available) had on juror perceptions of guilt and the verdicts reached by jurors. First, the results from PJAQ will be outlined, these results allowed participants to be categorised into bias groups: pro-prosecution, pro-defence and neutral. Second, descriptive statistics concerning the total belief of guilt score across each of the factors will be described. Third, the frequencies of each of the different verdicts given across each of the factors will be presented. Then, an ANOVA will be reported which tested the effects that each of the factors had on the total belief of guilt score. Finally, categorical analysis (i.e., log-linear analysis) which investigated the relationship that each of the factors had with the verdicts given variable will be presented.

5.3.1. Results from the PJAQ.

Table 13 shows the descriptive statistics for each of the six constructs measured by the PJAQ. The lowest mean was found within the construct of criminality and the highest mean was found within the construct of cynicism towards to the defence. Minimal outliers were present and only three responses were missing in the whole data set. The current

sample (N =128) will be unaffected by these missing scores and outliers (Laerd Statistics, 2017).

Table 13

Descriptive statistics for the constructs within the PJAQ.

Name of Construct	System Confidence	Conviction Proneness	Cynicism Toward the Defence	Racial Bias	Social Justice	Innate Criminality
Mean	15.32	13.99	20.16	8.57	12.58	7.53
Standard Deviation	3.16	3.23	3.69	2.12	2.30	2.16

These constructs were summed together to create a total bias score ($M = 76.30$; $SD = 9.81$). This score was found to be normally distributed and ranged from 54 to 101. The standard deviation of this total bias score was then used to categories individuals into bias groups: pro-prosecution, pro-defence and neutral. Individuals one standard deviation below the mean were coded as pro-defence, participants scoring one standard deviation above the mean were coded as pro-prosecution, and the remaining scores were coded as neutral. Twenty participants were coded as pro-prosecution ($M = 90.50$; $SD = 3.22$), 87 participants were coded as neutral ($M = 76.74$; $SD = 5.56$), and 21 participants were coded as pro-defence; see Table 14 for descriptive statistics for each of the bias categories across the total bias score.

Table 14

Descriptive statistics for each of the bias categories across the total bias score.

Category	Mean	Standard Deviation	Minimum	Maximum
Pro-Prosecution	90.5	3.22	87	101
Neutral	76.74	5.56	67	86
Pro-Defence	60.65	4.25	54	66

5.3.2. Data Treatment for the total belief of guilt score.

For each of the vignettes, all of the belief of guilt scores given were summed to create the total belief of guilt score. This meant that for the total belief of guilt score analysis each participant was counted twice.

5.3.3. Descriptive statistics for the total belief of guilt score across anchor, pre-trial bias, and the number of verdicts available.

Before inferential statistics could be conducted, descriptive statistics were explored. The data were found to be normally distributed, with minimal outliers present, thus allowing parametric testing to be applied (Laerd Statistics, 2017). Table 15 presents the descriptive statistics for each of the three factors: pre-trial bias (pro-prosecution, pro-defence and neutral), anchor (high and low), and number of verdicts available (two versus three).

Table 15

Descriptive statistics for each of the factors across the total belief of guilt score.

	Total belief of guilt score	
Variable Name	Mean	Standard Deviation
Pre-Trial Bias Condition:		
Pro-Prosecution	89.67	19.10
Neutral	83.42	23.33
Pro-Defence	67.75	31.68
Initial Anchor Condition:		
Weak	84.32	24.91
Strong	79.32	25.16
The Number of Verdicts Available Condition:		
Two	82.90	24.92
Three	80.75	25.36

Table 15 highlighted that the total belief of guilt score was higher in pro-prosecution individuals than it was in both neutral and pro-defence individuals. Neutral individuals were also found to have a higher total belief of guilt score in comparison to pro-defence individuals. In addition, the total belief of guilt score was higher in the weak anchor condition than it was in the strong anchor condition, and responses in the two-verdict condition were slightly higher in comparison to the three-verdict condition.

5.3.4. Categorical data treatment.

Initially, both the anchor and the number of verdicts available factors were treated as within-subjects factors. However, this design violated the assumptions of log-linear analysis and the Chi-Square test of independence. The current researcher, therefore, replicated the analysis of Smithson et al. (2007), who also investigated the effects of the inclusion of the Not Proven verdict, by only analysing the first verdict returns (i.e., the first verdicts that were given by participants out of the two trials they saw). These first verdict returns were counterbalanced across both the anchor and the number of verdicts available factors. In addition, the first verdict returns were also counterbalanced across the different vignettes. This data treatment allowed the factors of anchor and the number of verdicts available to be treated as between-subjects factors, thus allowing the assumptions of the log-linear analysis and the Chi-Square test of independence to be met.

5.3.5. Frequency of each of the verdicts given within anchor, pre-trial bias and the number of verdicts available.

Before the log-Linear analysis could be conducted, the frequencies of each of the verdicts given across each of the factors (pre-trial bias, anchor and the number of verdicts available) was explored. Table 16 shows the verdict frequencies across each of the different factors; these frequencies were acquired from both vignettes one and two, but only the first verdict responses that were given by the participants were used for analysis.

Table 16

Verdict frequencies across each of the three factors.

	Verdict Given Frequency			
Name of Variable	Guilty	Not Guilty	Not Proven	Total
Pre-Trial Bias Condition:				
Pro-Prosecution	9	7	4	20
Neutral	32	33	22	87
Pro-Defence	2	11	8	21
Total	43	51	34	128
Initial Anchor Condition:				
Weak	23	25	16	64
Strong	20	26	18	64
Total	43	51	34	128
The Number of Verdicts Available Condition:				
Two	25	39	-	64
Three	18	12	34	64
Total	43	51	34	128

Table 16 shows that individuals in the pro-prosecution group gave Guilty verdicts more frequently in comparison to the other verdict types. Both neutral and pro-defence participants most frequently gave Not Guilty verdicts in comparison to the other verdict types. However, neutral participants gave more of each of the different verdicts than the other participants (pro-prosecution and pro-defence) did.

In both of the anchor conditions, participants most frequently gave Not Guilty verdicts in comparison to other the verdict types. Not Guilty and Not Proven verdicts were most common in the strong anchor condition, whereas Guilty verdicts were most common in the weak anchor condition.

In the two-verdict condition, participants most frequently gave Not Guilty verdicts over Guilty verdicts. In the three-verdict condition, individuals most frequently gave Guilty verdicts in comparison to Not Guilty verdicts. However, both Guilty and Not Guilty verdicts were more frequently given in the two-verdict system in comparison to the three-verdict system.

5.3.6. Testing the effects that each factor (pre-trial bias, anchor and the number of verdicts available) had on the total belief of guilt score.

5.3.6.1. Comparing the total belief of guilt score across the factors.

To test the effects of each of the factors on the total belief of guilt scale, two paired samples t-tests and a one-way between-subjects ANOVA were conducted. The first paired samples t-test investigated the effects of the anchor factor across the total belief of guilt score. It was found that anchor had no significant effect on the total belief of guilt score [$t_{(127)}$ = -1.66, p = .10, d = .20]. The second paired samples t-test investigated the effects of the number of verdicts available factor on the total belief of guilt score, and it was found that no significant main effect existed [$t_{(127)}$ = .756, p = .45, d = .12]. The one-way between-subjects ANOVA found that there was a significant main effect of pre-trial bias on the total belief of guilt score [$F_{(2, 256)}$ = 9.49, p <.001, ηp^2=.07]. Tukey's post hoc tests highlighted that the total belief of guilt score given by individuals in the pro-prosecution (M = 89.67) bias group were not significantly (p =.31) different to the total belief of guilt scores given by individuals in the neutral group (M = 83.42). The pro-

prosecution bias group gave a significantly (p <.001) higher total belief of guilt score than the pro-defence bias group (M = 67.75). The neutral group was also found to give a significantly (p =.001) higher total belief of guilt score in comparison to the pro-defence bias group. See Figure 10 for visual illustration of the pre-trial bias main effect.
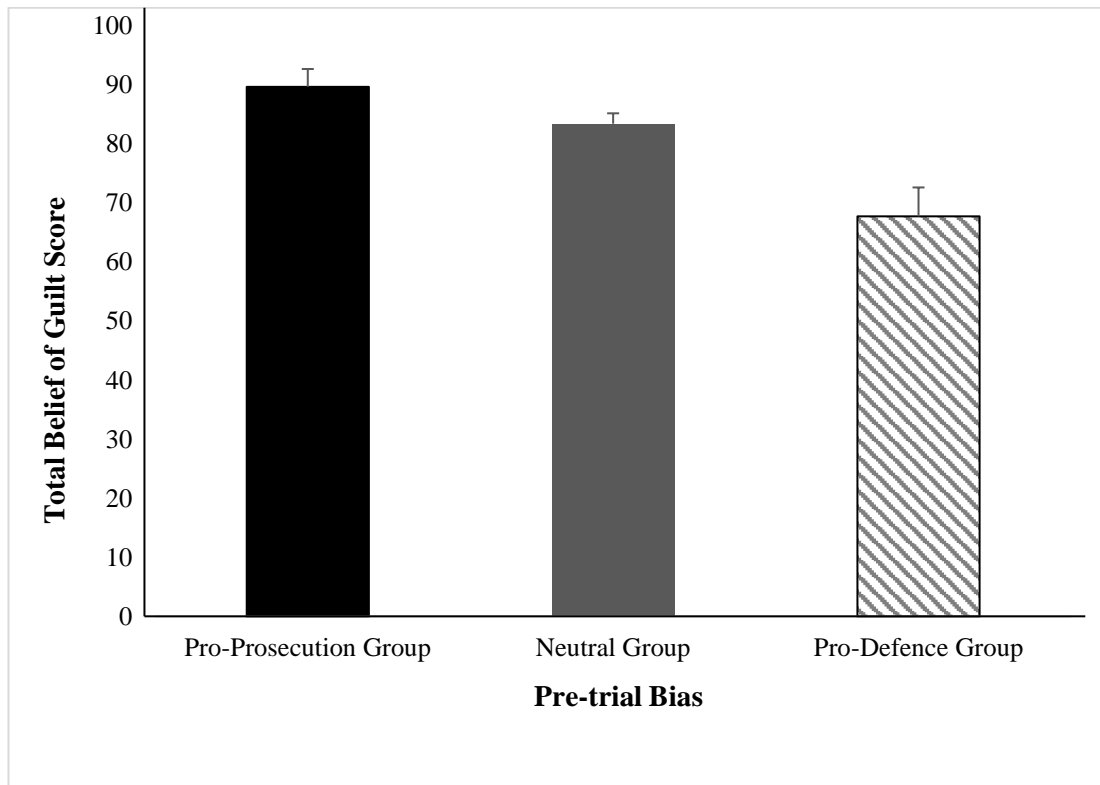
Figure 10. Pre-trial bias main effect on the total belief of guilt score.

5.3.7. Investigation of the association between the Verdict Given variable and each of the factors (pre-trial bias, anchor and the number of verdicts available).

A four-way log-linear analysis was conducted to investigate whether or not the factors of pre-trial bias (pro-prosecution, pro-defence and neutral), anchor (strong vs. weak) and the number of verdicts available (two vs. three) were significantly related to the Verdict Given variable.

The four-way log-linear analysis used a backward elimination with a saturated model (as recommended by Field, 2013) and produced a final model that retained two-way order effects. The likelihood-ratio of this model was non-significant [X^2 (24) = 12.88, p =.97], which showed that the observed frequencies were similar to the expected frequencies (i.e., that the current model is a good fit). Two-way interactions were found to be significant [X^2 (13) = 77.42, p <.001], meaning that the removal of two-way interactions would significantly affect the models fit (Field, 2013), and were therefore retained (as previously mentioned). Partial associations showed that the interaction between the Verdict Given variable and the number of verdicts available factor was significant [X^2 (2) = 63.22, p <.001]. To break this finding down, two Chi-Square test of independence were conducted.

When investigating the relationship between the Verdict Given and the number of verdicts available, two separate Chi-Square tests of independence were conducted. In the first, Not Proven verdicts were combined with Not Guilty verdicts. In the second, Not Proven verdicts were combined with Guilty verdicts. This was conducted as Not Proven verdicts could not be given in the two-verdict system, yet the Chi-Square test of independence would have still produced an estimated frequency for Not Proven verdicts within the two-verdict system, this would have nullified the results of said test. In addition, Hope et al. (2008) used a similar method of analysis when testing the relationship between the verdict that was given and the number of verdicts available.

When Not Proven verdicts were combined with Guilty verdicts, it was found that jurors in the three-verdict condition (23.5%) were significantly less likely to reach a Not Guilty verdict in comparison to jurors in the two-verdict condition (76.5%) [x^2 (1) = 23.76, p <.001, ϕ =.43]. In addition, when Not Proven verdicts were combined with Not Guilty verdicts, it was found that jurors in the three-verdict condition (41.9%) gave fewer Guilty verdicts than jurors in the two-verdict condition (58.1%), this association was found not

to be significant though [x^2 (1) = 1.72, p =.19, ϕ =.12]. In summary, the inclusion of the Not Proven verdict reduces the likelihood of the Not Guilty verdict being chosen.

5.4. Discussion

The current study took a bounded rationality approach to juror decision making, and aimed to investigate how internal heuristics (the anchoring and adjustment heuristic), differences in the decision maker (pre-trial biases), and differences in the legal environment (two vs. three-verdicts) influenced both juror perceptions of guilt and the verdicts given by jurors. First, this discussion will explore whether or not pre-trial biases (pro-prosecution, pro-defence and neutral) influenced both the verdicts given by jurors and juror perceptions of guilt. Second, a discussion surrounding the influence that evidence anchors (strong and weak) had on both juror perceptions of guilt and the verdicts given by jurors will be presented. Third, this section will progress to discussing the influence that the number of verdicts available (two vs. three-verdicts) had on both the verdicts that were given by jurors and juror perceptions of guilt. Then, a broader discussion around limitations and future directions will be outlined.

5.4.1. Pre-trial biases

The current section aimed to investigate whether or not pre-trial biases influenced juror perceptions of guilt and the verdicts given by jurors. This section will first discuss the effects that pre-trial biases had on the perception of guilt. The section will then progress to a discussion on the influence that pre-trial biases had on the verdicts that were given by jurors.

The results found that the factor of pre-trial bias had a significant main effect on the total belief of guilt score, which highlights that pre-trial biases might influence juror

perceptions of guilt. This finding allowed the first hypothesis to be supported. Previous research by Estrada-Reynolds et al. (2015) found complementary results: these researchers categorised participants into groups (pro-prosecution, neutral and pro-defence) and found that pre-trial biases could predict final sentence recommendations. These results also suggest that pre-trial biases might influence how jurors perceive defendants. The current results also link closely with level six of Dror's (2016) hierarchy of expert performance − even though jurors are not experts − as the current research showed that despite the fact that participants were shown the same pieces of information, different total belief of guilt scores were given, which suggests that pre-trial biases may have influenced juror perceptions of guilt. Furthermore, both previous research and the current study has shown that pre-trial biases might influence juror perceptions of guilt surrounding the defendant.

Post hoc analysis on the current data revealed that the pro-prosecution biased individuals did not give significantly different total belief of guilt scores in comparison to neutral individuals. One explanation for this result may relate to the fact that the neutral group's total belief of guilt scores were relatively high and this may have caused a ceiling effect. There are two reasons for why the neutral group would have had such high scores. One reason is that no juror is a "Tabula Rasa" (Kaplan & Miller, 1978) and that all jurors have a bias, regardless of whether it has been measured or not. This explanation falls down, however, when pre-trial biases are viewed as being merely relative, as the neutral group is only less biased in relation to its counterparts: pro-prosecution and pro-defence. Further, the neutral group may have had some biases, but would have had a lower level of bias, relative to the other two groups, thus this explanation cannot account for the above results.

A second reasoning is that the neutral group can be used as a fair control, and that the pro-prosecution group did not differ significantly from the control group because of a

reduction, or an attenuation, of their biases. Kaplan and Miller (1978) used the information integration theory to explain how jurors make judgements, arguing that decisions are made in the mind by averaging the weight (or strength) of the initial impression of a case (i.e., bias) with the weights associated with each piece of evidence. They suggested that a bias could be reduced by telling jurors to ignore their initial weighted bias, but they admitted that this is probably unrealistic. Instead, Kaplan and Miller (1978) proposed that weight is relative, and that one piece of information can only be perceived as strong if it is seen as being stronger than another piece of information. Therefore, the influence that the initial weight or bias can have on the outcome can be decreased by only using strong pieces of evidence (Kaplan & Miller, 1978). This may then highlight that the reason pro-prosecution biased participants did not significantly differ from neutral participants in relation to the total belief of guilt score may have been because the strength of the evidence presented in the vignettes allowed the pro-prosecution bias to be attenuated.

However, the experiment by Kaplan and Miller (1978) is dated, and when the researchers asked for the most important pieces of information to be stated and ordered, they did not do this in real time, leaving the strength/ weight ratings open to hindsight bias. Therefore, more modern, and valid, literature is needed to back up the current explanation. De La Fuente et al. (2003) found that evidence strength mediated the relationship between pre-trial biases, which had two conditions (prosecution biased and defence biased jurors), and the Verdict Given , thus showing that strong evidence can attenuate juror biases. Consequently, the reason the prosecution bias group did not differ significantly from the neutral group in the current study may have been because the strength of the evidence presented in the vignettes reduced the effects of this bias.

The post hoc analysis also showed that the pro-defence bias group gave significantly lower total belief of guilt scores than both the neutral and pro-prosecution bias groups.

Interestingly, unlike most biases, the pro-defence bias may be perceived positively, and this may explain why the pro-defence bias continued, when the pro-prosecution bias was attenuated (Kaplan & Miller, 1978). For instance, Blackstone (1969/1962, p.420) stated: "*It is better that ten Guilty persons escape than one innocent suffer*". Therefore, in a legal sense, it may be better for jurors to be on the side of caution and favour the defence. Jurors have been historically told to assume innocence prior to a trial, which suggests that the pro-defence bias has been reinforced/favoured by the courts (Kaplan & Miller, 1978). This reinforcement by the legal system/society may explain why the pro-defence bias influenced the perception of guilt in the current study. Ultimately, it seems that the effects of the pro-prosecution bias may not be disastrous, and may mirror neutral individuals, as the evidence presented in the vignettes may have attenuated said bias; and, the pro-defence bias may cause leniency towards the defendant, and this leniency may be favoured/reinforced by the legal system.

In addition, the log-linear analysis highlighted that no significant association existed between the Verdict Given and pre-trial bias. Therefore, the second hypothesis (i.e., pre-trial bias will be significantly associated with the Verdict Given) was rejected. This result is a positive finding and suggests that pre-trial biases do not influence the verdict that is given. These results do deviate from what previous research suggests, however. Estrada-Reynolds et al. (2015) found that pre-trial biases influenced final sentence recommendations in a death penalty trial, and Lecci and Myers (2009) found that pre-trial biases could explain 9.6% of the variance in verdicts given before the deliberation. However, sentence recommendations are not verdicts and death penalty trials are very emotive, which may promote pre-trial biases; thus, the difference in measure and type of trial may explain why the current results differ from Estrada-Reynolds et al.'s (2009) findings. Further, Lecci and Myers (2009) did not categorise participants into different bias groups, rather they investigated if the PJAQ could predict the verdicts that were

given, thus the PJAQ may allow verdicts to be significantly predicted, but specific biases such as pro-prosecution, neutral and pro-defence may not have an impact on the verdict that is chosen. One explanation for the current study's findings is that pre-trial biases were attenuated through the evidence being strong in the current study, which means that verdicts may have been reached through the integration of strong pieces of evidence rather than by using pre-trial biases (Kaplan & Miller, 1978).

In summary, the current results suggested that pre-trial biases had a significant effect on the perception of guilt, but did not influence which verdict was chosen. In the current study, belief of guilt was measured after each piece of evidence and these values were then combined to create the total belief of guilt score, meaning that pre-trial bias effects that occurred early in the trials/vignettes may have affected the total belief of guilt scores given. Therefore, pre-trial biases may have been weighted heavily at the beginning of the trial/vignettes (which explains why pre-trial biases influenced the total belief of guilt scores). Then, as the trial progressed, the weight of the combined evidence may have helped to attenuate the effects of pre-trial biases, thus allowing verdicts to be based on trial evidence rather than pre-trial biases (De La Fuente et al., 2003; Kaplan & Miller, 1978). The current study, however, cannot test this as evidence weights were not asked for. The next section will discuss the factor of anchor, and the impact that said factor had on the perception of guilt and the Verdict Given .

5.4.2. Initial anchor.

The current section will discuss the results and hypotheses relating to the anchor factor. The results and hypotheses of the current study will be discussed first, and then this section will progress to presenting the implications of the current results. First, it was found that no significant differences existed between the conditions of strong anchor and

weak anchor in relation to the total belief of guilt score. This allowed the third hypothesis (i.e., initial anchors will have a significant main effect on the total belief of guilt score) to be rejected. In addition, it was found that there was no significant association between the anchor factor and the frequency of the verdicts given. This allowed the fourth hypothesis (i.e., the initial anchor will be significantly associated with the Verdict Given) to be rejected.

The results above deviate from the findings of Chapman and Bornstein (1996), as they found that evidence strength anchors could be used to anchor both causality judgements and liability ratings in civil court cases. Individuals provided with strong anchors gave larger causality judgements and were more likely to perceive the defendant as liable in comparison to individuals who were shown weak anchors (Chapman & Bornstein, 1996). The measures used by Chapman and Bornstein (1996) mirrored the measures used in the current study, as liability ratings were categorical (i.e., either liable or not liable) which is similar to the Verdict Given (Guilty, Not Guilty and Not Proven) variable that was used in the current study. Further, causality judgments were similar to the total belief of guilt measure used in the study, as both responses measured the juror's perception of the degree of the defendant's role in the wrongdoing actioned upon the victim/plaintiff. Nevertheless, despite the similarities between Chapman and Bornstein's (1996) study and the current research, no significant findings relating to anchor were found in the current study.

One explanation for the current investigations findings may be that the anchoring and adjustment heuristic only occurs with numerical anchors and does not occur with anchors that are based upon only evidence strength. For instance, the anchors in the current study related to how strong evidence types were perceived to be in a pilot. This pilot found that DNA evidence was rated significantly higher than other evidence types (i.e., eyewitness testimony, expert testimony and secondary confessions), whereas secondary confessions

were rated significantly weaker than the other evidence types (mentioned above; see appendix A for more details on pilot). Therefore, DNA evidence was used as the strong initial anchor and secondary confessions were used as the weak initial anchor throughout the vignettes in the current quasi-experiment.

Chapman and Bornstein's (1996) vignettes centred on a woman suing her health-maintenance organisation, as she claimed that the contraceptive pill that they had prescribed her had caused her to develop ovarian cancer. Participants were presented with either a weak anchor, which suggested that 10% of experimental rats given the pill developed ovarian cancer, or a strong anchor, where 90% of the experimental rats given the pill acquired ovarian cancer. Therefore, Chapman and Bornstein's (1996) anchors had numerical values, meaning that the anchoring effect could have been down to the numerical values in the anchors rather than the strength of the anchors. In summary, jurors may not anchor their perception of guilt, or causality judgments, on evidence anchors, and rather they may only anchor their judgements on observed numerical anchors. This raises a number of implications in regard to the applied value of the anchoring and adjustment heuristic.

One implication of the current results is that the anchoring and adjustment heuristic is a product of experimental design rather than a cognitive short cut that is used in real life decisions. Gigerenzer (1991) found that commonly studies biases, such as the overconfidence effect, baseline neglect and the conjunction fallacy, disappear once participants are tested using more naturalistic responses. For instance, the overconfidence effect has been commonly studied by first asking participants to give an answer to a question (e.g., 'does Glasgow have a higher population than Edinburgh?'), then following up said question with a further question asking the participants to state how confident they are that they gave the right answer (Gigerenzer, 1991). In these one-off scenarios, a

bias may emerge, as participants are more confident in their abilities than they should be. However, if participants are asked over a number of questions to state the relative frequency of their correct responses, the overconfidence bias disappears (Gigerenzer, 1991). The current study then may have highlighted that the anchoring and adjustment heuristic is not a cognitive short cut that allows decision makers to make judgement, and rather that participants may use numerical anchors as they think that said information must have some value because the researcher presented it (Orr & Guthrie, 2005). Furthermore, in the current study, the anchoring and adjustment heuristic was investigated in a real life decision environment, where the anchor was not purely numerical, and it was found that the anchoring effect disappeared, thus suggesting that the anchoring effect is a product of the laboratory.

In summary, the current section has highlighted that anchors did not influence juror perceptions of guilt surrounding the defendant, and that anchors did not have an impact on the verdict that was chosen. These results differed from the findings of Chapman and Bornstein (1996) who found that evidence strength anchors influenced both liability ratings and causality judgments. The contrast in the results between Chapman and Bornstein's (1996) research and the current study may be down to a difference in the evidence strength anchors. The current results may help to support Gigerenzer's (1991) claims that heuristics and biases are a product of experimental design rather than being decision strategies with applied value. The next section will discuss the number of verdicts available factor and its impact upon juror decision making.

5.4.3. The number of verdict available.

The current section will first discuss whether or not the number of verdicts available influenced the number of Not Guilty verdicts given. Then, this section will discuss if the

number of verdicts available influenced juror perceptions of guilt. Finally, the implications of these results will be discussed (Hope et al., 2008).

First, it was found that jurors in the three-verdict condition were significantly less likely to give Not Guilty verdicts in comparison to jurors in the two-verdict condition, thus allowing hypothesis five to be accepted. Both Hope et al. (2008) and Smithson et al. (2007) found the same result in their own previous research. In addition, it was found in the current study that Guilty verdicts were equally likely across the two conditions. These two results taken together support Smithson et al.'s (2007) conclusion that the Not Proven verdict does not sway jurors away from the Guilty verdict, and rather that the Not Proven verdict decreases the number of Not Guilty verdicts given. This decrease in Not Guilty verdicts when the Not Proven verdict is available highlights that jurors are deviating from the regularity principle, which is a key component of many rational choice models (Hope et al., 2008). This is because if jurors are shown the same/similar pieces of evidence, it would be expected that the initial set of verdict options (i.e., Guilty and Not Guilty) should be given with the same frequency regardless of whether a Not Proven verdict is included or not. The current section will now discuss possible explanations for this deviation from what the rational choice model would expect.

The results from the current investigation suggested that asymmetrical dominance (see Bhatia, 2004) did not occur in the current study, as the availability of the similar, yet recessive, Not Proven verdict did not increase the number of Not Guilty verdicts given. The decrease in the number of Not Guilty verdicts given in the three-verdict system in comparison to the two-verdict system may propose that the Not Guilty verdict is interpreted differently in the three-verdict system than it is the two-verdict system (Jackson, 1998). The Not Guilty verdict may be given on two scenarios in the two-verdict system: 1) if the juror truly believes the defendant is innocent; and 2) when the juror believes that the defendant is probably guilty, but there is not enough evidence to convict.

However, in the three-verdict system, jurors may only give a Not Guilty verdict when the juror truly believes that the defendant is innocent, and any doubt concerning the innocence of the defendant may lead to a Not Proven verdict (Hope et al., 2008; Jackson, 1998). Further, the inclusion of the Not Proven verdict may allow members of the jury to communicate their belief of guilt more adequately to the courtroom.

This change in interpretation of the Not Guilty verdict may provide support for bounded rationality. Simon (1956) coined the term bounded rationality, and suggested that both the environment and the decision maker's cognition interact when a decision is being made. Therefore, a change in the number of verdict options available may change the juror decision making context, which may change how a juror interprets the Not Guilty verdict (i.e., a change in cognition) and this may then influence the final verdict that is reached. The Guilty verdict frequency did not significantly differ across the different conditions, however, which might suggest that the introduction of the Not Proven verdict does not change how the Guilty verdict is interpreted. This may be because the Not Proven verdict is an additional acquittal verdict, and has no direct competition with Guilty verdicts (Hope et al., 2008; Jackson, 1998).

One negative implication from the findings in the current study is that truly innocent individuals in the three-verdict system may have a shadow placed over their innocence (Jackson, 1998), as they will be less likely to receive a Not Guilty verdict in comparison to their two-verdict counterparts. Further, Hope et al. (2008) found that their participants believed that a defendant that was given a Not Proven verdict would face more social stigma than a defendant that was given a Not Guilty verdict, and this could have severe implications for truly innocent defendants given Not Proven verdicts in serious crimes such as homicide. In addition, the inclusion of the Not Proven verdict may mean that jurors do not start a trial with a "presumption of innocence", which may limit how fair a

trial the defendant is given, and this may break article 6 of the European Convention on Human Rights (Council of Europe, 2010; Hope et al., 2008). Therefore, the Not Proven verdict may help jurors to communicate their belief of guilt to the court, but said verdict may have a negative impact on both human rights and truly innocent individuals.

In addition, the current study wanted to investigate if the different verdict systems had a significant effect on the perception of guilt; no significant difference was found. Hope et al. (2008) found that juror estimates of guilt surrounding the defendant did not differ in the two-verdict condition in comparison to the three-verdict condition, thus the current study's findings provide support to Hope et al.'s (2008) results.

Taking both the verdict and belief of guilt results together, the current study showed that the number of verdicts available did not have a significant impact on juror perceptions of guilt, but did influence the amount of Not Guilty verdicts given. These results have two theoretical implications. The first was that jurors do not make rational decisions. Jurors were presented with the same/similar pieces of information, and the perception of guilt did not differ across the two different verdict systems. Therefore, if jurors were being rational, it would be expected that the initial decision set (Guilty and Not Guilty) would be chosen with the same frequency regardless of whether or not the Not Proven verdict was included. This did not occur, however, suggesting that jurors were deviating from the regularity principle, which is part of many rational choice models (Hope et al., 2008). The second was that bounded rationality might explain why jurors deviate from what would be expected in rational choice models. Simon (1956) and, more recently, Gigerenzer and Goldstein (1996) have suggested that cognitive processes are simplistic and have evolved to adapt to an ever changing environment. Therefore, if the juror environment changes (i.e., a Not Proven verdict is included) then cognition may change (i.e., the interpretation

of the Not Guilty verdict may change), meaning that similar perceptions of guilt may lead to different verdicts being chosen (Not Proven over Not Guilty).

5.4.4. Limitations and future research.

The limitations of the current piece of research will now be outlined. One limitation of the current piece of research may have been that the evidence anchors were based upon perceived strength scores given by the pilot sample rather than perceived strength scores given from the experimental sample. What the pilot sample perceived as strong pieces of evidence may have been different from the experimental sample. The pilot sample may have differed from the experimental sample in a number of ways. First, the pilot sample had less students and had a higher mean age than the quasi-experimental sample. A number of pieces of research have suggested that students behave differently from the general public in courtroom based tasks (Diamond, 1997), thus suggesting that the pilot sample may have perceived the evidence types differently to the quasi-experimental sample. Second, the experimental sample carried out the decision task in a quiet room in the Psychology Laboratory of Edinburgh Napier University, whereas the pilot sample gave their responses on an online inventory. Therefore, the different demographics and the different methods of collecting the data may have influenced how each sample perceived the different evidence types. Future research should replicate the current study, but also ask the experimental sample to rate the strength of the initial anchors, this would highlight whether or not the evidence anchors were reliable and valid.

A second limitation was that jurors were asked to state their belief of guilt on a visual guilt rating scale (see Figure 9) after the opening statement, after each piece of evidence and after each closing statement. This may have caused jurors to deliberate over the evidence more than they would have in a real courtroom environment, thus suggesting

that rational processing may have occurred in the current study, and this may explain why the initial anchors did not influence the total belief of guilt score. However, this seems unlikely as the total belief of guilt score was influenced by pre-trial biases, which suggests that the current procedure did not make jurors more rational.

In addition, the guilt rating scale used assumed that participants perceived guilt across a continuum, whereas the participants in the current study may have perceived guilt in a binary (Guilty or Not Guilty; Diamond, 1997) or tertiary (Guilty, Not Guilty and Not Proven) way. Diamond (1997) criticised previous juror research for using inappropriate dependent measures, such as likelihoods of guilt ratings, when measures that are more appropriate (i.e., verdicts) are available. Therefore, to counter these criticisms, the current piece of research studied the influence that extra-legal factors (such as pre-trial biases, initial anchors and the number of verdicts available) have on the Verdict Given , as well as on juror perceptions of guilt.

Another limitation of the current research was related to ecological validity, as a number of factors that occur in a courtroom cannot be replicated in juror decision experiments. For instance, an experiment cannot last as long as a real trial does, participants volunteer to take part in juror studies whereas an authoritative institution requests real life jurors, and mock jurors make decisions in a laboratory at a university rather than through a deliberation in a courtroom. However, only through simulation can juror and jury decision making be researched. Researchers can only see what variables/factors have an impact on the decision making processes and outcomes of jurors through controlled (quasi) experiments. In addition, real life jurors cannot be observed in the UK because of the contempt of court rule. Therefore, mock juror (or jury) simulations are the best psychologists can do just now. Future research should try to increase the ecological

validity of studies through hiring actors (to play lawyers and defendants), through mock jury deliberations and by using environments similar to legal institutions.

Two main areas of future enquiry have arisen because of the current results. The first line of enquiry that should be investigated relates to whether or not strong evidence attenuates pre-trial biases, and if some pre-trial biases are more resistant than others are to the effects of strong pieces of evidence. The current piece of research found that perception of guilt in the pro-prosecution group did not differ significantly from the neutral group. The reasoning offered for this finding was that said pre-trial bias was attenuated by the strength of the evidence in the current vignettes, as previous research has highlighted that pre-trial biases are attenuated by evidence strength (De La Fuente et al., 2003; Kaplan & Miller, 1978). However, the current piece of research found that the pro-defence bias group gave a significantly lower total belief of guilt score in comparison to both the pro-prosecution and neutral groups. This result then raises the following question, if the evidence strength did attenuate the pro-prosecution bias, why did it not attenuate the pro-defence bias? Furthermore, future research should investigate whether or not strong evidence attenuates pre-trial biases, and if certain pre-trial biases are more resistant to strong pieces of evidence than others are.

The second line of enquiry from the current study relates to how other additional verdicts may influence verdict choice. For instance, the current study found that the inclusion of the Not Proven verdict significantly decreases the number of Not Guilty verdicts given, and Smithson et al. (2007) found that the option of Manslaughter decreased the amount of Guilty and Not guilty verdicts given. Future research could investigate how other additional verdicts, such as the Guilty but Mentally Ill verdict and the diminished responsibility verdicts (Smithson et al., 2007), influence verdict choice. In addition, other jurisdictions have different legal proceedings; in Spain, the judge presents a series of

propositions and the jury decides proven or not proven to each of said propositions (Thaman, 1999). Therefore, future research could investigate whether or not differences in legal proceedings influence the decision making of jurors.

5.5. Conclusion

In conclusion, the current study showed that anchors and the number of verdicts available did not have a significant effect on the total belief of guilt score, but it was found that pre-trial biases did have an impact on said measure. In addition, it was found that the inclusion of the Not Proven verdict did make jurors less likely to give a Not Guilty verdict; this has positive implications concerning juror's abilities to communicate their belief of guilt to the court. On limitation of the current study related to ecological validity. It is believed, however, that this limitation was unavoidable as some courtroom factors (i.e., how real life jurors are selected) cannot be replicated in juror decision experiments. Future studies should investigate whether or not strong evidence attenuates pre-trial biases, and if some types of pre-trial biases (i.e., pro-defence) are more resistant to the de-biasing effects of strong evidence than others are. Furthermore, in tradition with bounded rationality, the current study has provided insight into the effects that the legal environment, prior beliefs, and cognitive short cuts may have on both juror perceptions of guilt and the verdict outcomes reached by jurors.

6. General Discussion

6.1. Thesis aims

The overarching aim of the current thesis was to identify the process through which jurors reach their verdicts. This was achieved through investigating different models (i.e., the Diffusion Threshold Model and Counter Threshold Model) of decision making; through studying how jurors process information; and by investigating how factors, such as individual differences (pre-trial biases), 'cognitive short cuts' (anchoring and adjustment) and different verdict systems (two vs. three-verdict systems), influence both juror perceptions of guilt and the verdicts reached by jurors. In addition, in this thesis, factors that may make the trial by jury process unfair for legal actors (i.e., the defence and the prosecution) were examined by investigating factors/variables such as pre-trial biases. The next section will give a brief overview of each of the studies presented in the current thesis.

6.2. Research investigations

Three studies were carried out to research the overarching research aim mentioned above, with the first taking a broad approach to the investigation of juror decision making within a three-verdict system. Initially, a literature review (Chapter two) highlighted that both rational and intuitive models of decision making could not explain decision processes on their own, and that unified threshold model of decision making could explain more decision making data than any single model could (Lee & Cummins, 2004). However, the previous literature did not highlight which threshold model of decision making (Diffusion Threshold Model vs. Counter Threshold Model) best explained juror decision processes within a three-verdict system. The first study (Chapter Three), therefore, sought to investigate which threshold model (i.e., the Diffusion Threshold Model versus the

Counter Threshold Model; see Ratcliff & Smith, 2004) of decision making best described juror decision processes within a three-verdict system. The major findings in the first study were that: 1) jurors integrated information until they reached a threshold; 2) thresholds were district across verdict types; 3) that threshold point and cue utilisation were significant predictors of the Verdict Given variable; and, 4) count information alone could not explain why thresholds were reached. Taking these findings together, it can be concluded that the Diffusion Threshold Model provides the most effective explanation of juror decision making within a three-verdict setting in comparison to the Counter Threshold Model. In addition, the results from study one support Ratcliff and Smith's (2004) conclusions, as study one found that the Diffusion Threshold Model of decision making explained more decision making data in comparison to the Counter Threshold Model of decision making.

The diffusion pattern of responses to the evidence presented in the first study suggested that jurors integrate information until they reach a threshold (Ratcliff & Smith, 2004), and that jurors apply confirmation bias once a threshold (or leading verdict) has been reached (Carlson & Russo, 2001). The second study (Chapter Four) investigated this explicitly, and found that in the pre-threshold condition, prosecution evidence generated higher likelihood of guilt ratings in comparison to defence evidence, regardless of the verdict type. This result suggested that information integration did allow thresholds to be reached, which fits with Ratcliff and Smith's (2004) description of the Diffusion Threshold Model of decision making. It was also found that confirmation bias/evidence distortion might indeed be promoted by the reaching of a threshold. This result supports Carlson and Russo's (2001) findings, as they also found that evidence distortion was caused through jurors having a pre-decisional preference for a verdict. Study two in the current thesis suggested that evidence distortion occurred post-threshold to reduce the cognitive dissonance that may have arisen because of the leading threshold/verdict being

challenged by novel evidence (Carlson & Russo, 2001). In addition, study two investigated if the Diffusion Threshold Model could be applied to juror decision making within a two-verdict system. The results, once again, highlighted that jurors integrate information until they reach a distinct threshold, thus suggesting that the Diffusion Threshold Model of decision making can be applied to a two-verdict juror decision context. In summary, the Diffusion Threshold Model of decision making can describe how jurors reach verdicts in the two-verdict system, and can explain why jurors may fall prey to confirmation bias and evidence distortion.

Additionally, study two raised two questions. First, are juror perceptions of guilt influenced by pre-trial biases? This question was raised because in study two the prior points were found to differ significantly across the verdicts (Guilty and Not Guilty). Second, is juror decision making influenced by the number of verdicts available (two vs. three)? The first study in this thesis investigated juror decision processes within a three-verdict system and the second study investigated juror decision processes within a two-verdict system, but these two systems had not been directly compared in the current thesis; consequently, the researcher wanted to rectify this. Study three was therefore designed to study each of these questions.

Study three took a bounded rationality approach to juror decision making, and investigated how factors, such as individual difference within jurors (i.e., pre-trial biases), differences in the decision environment (i.e., the number of verdicts available) and 'cognitive short cuts' (the anchoring and adjustment heuristic), influenced both juror perceptions of guilt and the verdicts given by jurors. The influence of anchors on juror perceptions of guilt and the verdicts they choose was tested because previous research had shown that civil court jurors fall prey to the anchoring effect (Chapman & Bornstein,

1996), but no research had investigated the influence of anchors within a criminal courtroom; therefore, the researcher wanted to rectify this.

The PJAQ was used to categorise participants into three bias groups: 1) pro-prosecution, 2) pro-defence, and 3) neutral. It was found that pre-trial biases did influence juror perceptions of guilt, with the pro-defence bias giving a significantly lower total belief of guilt score than the other groups (i.e., the neutral group and the pro-prosecution bias group). The pro-defence bias may have decreased juror perceptions of guilt as said bias is favoured and reinforced by the legal system (Kaplan & Miller, 1978). Pre-trial biases were found not to influence the Verdict Given . It was suggested that the influence of pre-trial biases on verdicts were attenuated by the strength of the evidence presented in the current vignettes.

The influence of the anchoring and adjustment heuristic on juror decision making was investigated by comparing the effects of strong and weak evidence anchors on juror perceptions of guilt, and by examining the association between the Verdict Given and the initial anchors. The results found that the anchoring and adjustment heuristic did not influence juror perceptions of guilt. Further, it was found that the Verdict Given did not significantly associate with the initial anchors. It was therefore suggested that heuristics and biases might be a product of the lab rather than being decision strategies that have applied value in real life decision environments (Gigerenzer, 1991).

Finally, it was found that jurors in the three-verdict condition were significantly less likely to give Not Guilty verdicts in comparison to jurors in the two-verdict condition. However, it was found that the number of verdicts available factor did not influence juror perceptions of guilt. The results suggested that jurors might be deviating from norms proposed in many rational choice models (see Hope et al. 2008), and that juror interpretations of the Not Guilty verdict may differ depending on how many verdicts are

available to them. In summary, in tradition with bounded rationality, study three provided insight into the effects that the legal environment, prior beliefs, and cognitive processes may have on both juror perceptions of guilt and the verdicts reached by jurors. The next section will discuss the overall findings of the current thesis.

6.3.   Overall Summary

The first two of the studies presented in the current thesis showed that the Diffusion Threshold Model of decision making could be used to describe the process through which jurors reach verdicts in both the two and three-verdict systems. This contradicts Thomas and Hogue's (1976) research, as they suggested that a Poisson Counter Threshold Model could be used to describe juror decision processes. Thomas and Hogue (1976), however, only tested the Poisson Counter Models ability to describe juror decision processes, whereas study one in the current thesis compared separate unified threshold models (Counter Threshold Model vs. Diffusion Threshold Model) in relation to their ability to describe juror decision processes, with the Diffusion Threshold Model being found to describe juror decision processes best. Therefore, it can be argued that the Diffusion Threshold Model of decision making can be used to describe juror decision processes.

The Story Model is another competing juror decision making model. In the Story Model, jurors create narratives throughout a case, and these narratives allow jurors to reach a verdict (Pennington & Hastie, 1981). Stories are based upon pre-trial knowledge, evidence and inferences about the crime (Pennington & Hastie, 1981). Stories are chosen if they are coherent and if they allow the evidence presented in the trial to be covered, the verdict that best aligns with the chosen story is then given. If the Story Model is adapted to allow a verdict to be favoured as a story is constructed (Carlson & Russo, 2001), then it could be argued that the Story Model can be incorporated within the Diffusion

Threshold Model of decision making. For instance, the process of information integration may highlight when a story has been generated, the reaching of a threshold may represent when a story is chosen, and frugal thresholds may signify that the chosen story is coherent and based on a limited amount of information. In addition, study two highlighted that the reaching of a threshold promoted confirmation bias/evidence distortion, and this may show that novel information is distorted once a story is chosen to be incorporated within the leading story (Carlson & Russo, 2001). Therefore, the Story Model may complement the Diffusion Threshold Model.

The three studies presented in the current thesis also highlighted that three factors (i.e., thresholds, pre-trial biases and the number of verdicts available) may make the trial by jury process unfair for legal actors (i.e., the prosecution and the defence). First, it was found (in study two) that thresholds promoted confirmation bias/evidence distortion. For example, it was found that both prosecution and defence evidence generated significantly higher likelihood of guilt ratings when a Guilty threshold was reached in comparison to when a Not Guilty threshold was reached. This suggests that if a Guilty threshold is reached, jurors will be biased against the defence, whereas if a Not Guilty threshold is reached, jurors will be biased against the prosecution. Carlson and Russo (2001) also found that pre-decisional verdict preferences lead to evidence distortion in jurors. Therefore, it can be said that pre-decisional verdict preferences, which may arise through thresholds being reached, may make the trial by jury process unfair for legal actors (i.e., the prosecution and the defence).

Second, pre-trial biases were found to influence juror perceptions of guilt, individuals categorised within the pro-defence bias group gave significantly lower perceptions of guilt in comparison to the other groups (neutral group and pro-prosecution bias group), thus showing that pre-trial biases may have a negative impact on how fair jurors are when they are forming judgements. In addition, Estrada-Reynolds et al. (2015) found that

sentence recommendations could be predicted using pre-trial biases, which further shows that pre-trial biases may have a negative impact upon the trial by jury process (i.e., pre-trial biases may make jurors less fair). Lecci and Myers (2009) found that pre-trial biases could be used to predict verdicts. Study three, however, found that pre-trial biases shared no significant association with the verdict that was given. This may have been because Lecci and Myers (2009) did not categorise participants into different bias groups, but instead investigated whether or not the PJAQ could forecast verdicts; thus, the PJAQ may allow verdicts to be forecasted, but specific pre-trial biases (i.e., pro-prosecution, neutral and pro-defence) may not influence the verdict that is chosen. Furthermore, pre-trial biases may make the trial by jury process unfair by distorting how jurors perceive information, but the negative effects of these pre-trial biases may not extend to when jurors are giving verdicts.

Third, it was found that jurors gave significantly fewer Not Guilty verdicts in the three-verdict system in comparison to the two-verdict system. Both Smithson et al. (2007) and Hope et al. (2008) have also found that the inclusion of the Not Proven verdict steers jurors away from the Not Guilty verdict. Therefore, it can be said that the inclusion of the Not Proven verdict has a negative impact upon the defence as it reduces the chances of the defence receiving a true acquittal.

In summary, the Diffusion Threshold Model of decision making can describe the process through which jurors reach verdicts more adequately than the Counter Threshold model can, the Story Model can be used to complement the Diffusion Threshold Model of decision making and that factors, such as thresholds, can make the legal system unfair for legal actors (i.e., the prosecution and the defence). The next section will discuss the implications that can be drawn from the research conducted in the current thesis.

6.4. Implications

Both theoretical implications for decision science and practical implications of relevance to legal practitioners will be discussed in the current section. First, theoretical implications will be discussed, and then practical implications will be outlined.

6.4.1. Theoretical implications.

First, the current thesis has shown that the Diffusion Threshold Model of decision making is applicable to juror decision making, and that said model is a better fit than the Counter Threshold Model. The findings in the current thesis suggested that mock jurors process information, integrate the information and cross thresholds; the crossing of a threshold allows one verdict to be favoured. The results in the current thesis also highlighted that a unified threshold model that combines both rational and intuitive decision processes, through allowing thresholds to vary in regard to cue utilisation (i.e., Guilty thresholds were reached using less cues than Not Guilty threshold), is realistic (Lee & Cummins, 2004). In addition, despite Ratcliff and McKoon's (2008) claims, study one showed that the Diffusion Threshold Model can explain decisions that have more than two forced choice decisions and that are slower than 1500 milliseconds

The second key theoretical insight from this thesis is that individuals can still integrate information in addition to using a frugal amount of cues. Previous normative decision models, such as Bayesian models and information integration models, have tended to combine information integration and compensatory decision making within the rational decision making camp, and have perceived frugal cue utilisation as being distinct from information integration (Kahan, 2015; Kaplan & Miller, 1978). In addition, Gigerenzer and Goldstein (1996) suggested that individuals do not integrate information, and that decisions are made once a cue can differentiate the decision outcomes. Conversely, the current research has shown that jurors can integrate information until they reach a

threshold (and sometimes after), which then allows a decision to be made, and that they reach that threshold using fewer cues than are presented.

In addition, the results found in the current thesis show that both information integration and confirmation bias occur with the juror decision making context. The thesis has shown that information integration allows thresholds to be reached and that thresholds promote confirmation bias. In other words, there are two stages to juror decision making. In the first stage, jurors do not have a favoured verdict, and this allows them to integrate information until a threshold is reached (Ratcliff & Smith, 2004). In the second stage, jurors do have a favoured verdict, and this leading verdict may create cognitive dissonance, as the belief system surrounding the leading verdict may differ from the belief system being presented by the incoming novel evidence (Jonas et al., 2001). Confirmation bias and pre-decisional distortion may then set in to reduce cognitive dissonance, which would allow confirming evidence to be seen positively and disconfirming evidence to be distorted or disregarded to support the leading threshold (Carlson & Russo, 2001; Estrada-Reynolds et al., 2015). However, some disconfirming evidence is "elastic" (eyewitness testimony) and easy to skew, whereas other pieces of evidence (DNA) are strong and not so malleable (Ask et al., 2008, p.1245). When strong evidence is presented, the only way jurors can reduce cognitive dissonance is by changing their perception of guilt. This incorporation of a strong piece of disconfirming evidence may simply decrease the confidence a juror has in a verdict or it could lead to a verdict reversal.

An unexpected implication of the research presented in the current thesis was that heuristics and biases disappear when studied using realistic experimental designs rather than hypothetical riddles. Gigerenzer et al. (1991) were the first to investigate this. They suggested that commonly studied cognitive fallacies, such as the overconfidence effect, occur when the experimental design is unrealistic. Further, study three showed that

evidence anchors had no effect on both juror perceptions of guilt and the verdicts given by jurors. This may have been because study three did not use artificial numerical anchors, and the anchoring effect may only be produced in artificial environments where false numerical anchors are provided to participants. Therefore, the anchoring effect may be a product of the lab rather than of the mind. The next section will discuss the practical implications of the current thesis.

6.4.2. Practical implications.

One practical implication of the current research relates to thresholds and pre-decisional distortion/confirmation bias. Study two highlighted that pre-decisional distortion and confirmation bias are promoted through jurors reaching a threshold. To prevent both confirmation bias and pre-decisional distortion, thresholds that use all the information (i.e., a high cue utilisation) presented in a trial should be promoted. Judges do instruct jurors to wait until all of the evidence has been heard before they reach a verdict, but these instructions are normally given once all the evidence has already been presented (Diamond, 1993). Therefore, the current research would recommend that jurors be given said instructions at the beginning of a trial (Carlson & Russo, 2001) as this may help to stop thresholds being reached prematurely. The current research, and similar research, should also be used by judges to highlight to jurors the dangers of favouring a verdict (reaching a threshold) before all the evidence has been heard (Carlson & Russo, 2001).

Pre-trial biases, particularly pro-defence and pro-prosecution, were found to have differing effects in relation to juror perceptions of guilt. Previous research has shown that pre-trial biases flourish in ambiguous cases, as strong evidence is not available to attenuate these pre-trial biases (De La Fuente et al., 2003; Kaplan & Miller, 1978). Most trials are inherently ambiguous (Arkes, & Mellers, 2002) because if trials were not

ambiguous they would either not reach court or a settlement would be reached (Arkes, & Mellers, 2002). This may therefore suggest that a screening tool, which investigates for potential juror biases, may allow biased individuals to be identified and removed from jury duty, thus allowing the trial by jury process to be fair even in ambiguous cases. However, there are problems with screening tools, as prospective jurors may lie and said tools may lead to a much more restricted sample of jurors being selected (Kaplan & Miller, 1978), thus legal professional should consider the current findings alongside these potential ethical concerns.

A final practical implication, and potential policy, of the current thesis relates to the research conducted on the Not Proven verdict. The research showed that jurors in a three-verdict system were less likely to give a Not Guilty verdict in comparison to jurors in a two-verdict system. This finding suggests that jurors in a three-verdict system do not have to give an outright acquittal if they doubt the defendant's innocence and can instead give a Not Proven verdict (Jackson, 1998), meaning that the Not Proven verdict may allow jurors to communicate their belief of guilt more adequately to both the judge and the public. This hints that the Not Proven verdict does have some positive implications within the courtroom. The next section will discuss relevant limitations of all three of the studies conducted in the current thesis.

6.5. Limitations

All three of the current studies have limitations relating to research design and ecological validity. First, in all three studies, jurors were asked to state their belief of guilt (either through a likelihood of guilt rating in study one and two, or a through a visual scale rating in study three) after each piece of evidence. This may have caused the participants to independently rate and integrate each piece of evidence, which may have promoted a

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more rational decision process than would have occurred in real life jurors. However, in order to investigate juror perceptions of guilt and information integration/evidence distortion within jurors, it was necessary to obtain a belief of guilt rating after each piece of evidence.

A second limitation of all three of the studies in the current thesis was related to ecological validity. The researcher did try to increase the ecological validity of the studies though through utilising audio vignettes from study two onwards. However, the studies carried out in the current research thesis could not replicate real life juror decision making in a number of ways. First, jurors make decisions in the courtroom rather than in a laboratory, this may mean that mock jurors may take juror trials less seriously than real life jurors do (Diamond, 1997). Second, the legal system requests jurors, whereas participants volunteer to be mock jurors, meaning that most people could be prospective jurors, but only a specific type of person (i.e., curious individuals that are interested in crime) may participate in juror studies; this limits the generalisability of juror decision making research. Third, a juror decision making task cannot last as long as a real trial does because of time constraints, meaning that less information is presented to mock jurors in comparison to real life jurors, which may cause mock jurors to use inferences more than real life jurors do (Diamond, 1997). Nevertheless, research by Pezdek et al. (2010) suggested that juror decision making is influenced by the content in the vignettes and not how ecologically valid the juror decision experiment is. In summary, the ecological validity of each of the studies may have been limited by their artificial designs, but the researcher did attempt to increase the ecological validity of the studies through using audio vignettes, and that some of the issues surrounding ecological validity could not be rectified as they were outwith the control of the researcher (i.e., the researcher did not have access to a real life courtroom).

A final limitation of the current thesis was that none of the studies investigated *jury* decision making. It is important to investigate how individual jurors reach verdicts, how they process information and which biases have an impact upon their judgement. However, the current study does not highlight how these individual juror decisions are then implemented within a jury verdict. Jury decision making was outwith the scope of the current thesis, but future research could investigate the group decision processes that occur within the deliberation room; please see the next section (i.e., ' 6.6. Future research') for more information.

6.6.   Future research

Juror decision making was investigated in detail in the current thesis. However, trials involve jurors who deliberate over cases and make decisions as a group. Future research should extend the current investigation, and establish whether or not deliberations have an effect on juror decision making. Previous research has shown that deliberations might increase juror thresholds (Kerr, 1993), which might suggest that information integration is increased through deliberations, as more information has to be collected before a decision can be made. However, De La Fuente et al. (2003) found that deliberations increased the effects that pre-trial biases may have on juror verdict choice, which would suggest that deliberations decrease the amount of information integrated. Future research should investigate the influence that jury deliberations may have on the effects of pre-trial biases.

 In addition, some pieces of previous research have shown that deliberations influence jury verdict choice (Ellsworth, 1989; Kerwon & Shaffer, 1994; Sandys & Dillehay, 1995), whereas other pieces of research have suggested that pre-deliberation verdicts are associated with the jury's verdict (Kalven & Zeisel, 1966; Stasser, Kerr, & Bray, 1982).

Therefore, future research might investigate the role that jury deliberations play in how a verdict is chosen by the jury. The next section will present a general conclusion.

6.7.   General Conclusion

The current thesis aimed to identify the process through which jurors reach their verdicts. To do this, the current thesis utilised a bounded rationality approach, as the internal decision making processes of jurors (i.e., Diffusion Threshold model) and the effects of changing decision making environments (three-verdict system vs. two-verdict system) were studied. In addition, the research has utilised research from psychophysics, the heuristics and biases programme, and individual differences to gain an insight into juror decision making. The overarching findings of the current thesis suggest that the Diffusion Threshold Model can effectively explain juror decision making in both the three and two-verdict system, and that jurors integrate information until they reach a threshold, which then allows a response to be given. In addition, it was found that thresholds can vary in regard to cue utilisation, with Guilty verdicts using fewer cues than acquittal verdicts (Not Guilty and Not proven). This is an important finding within the field of decision science, as it highlights that both rational and intuitive decision making models can be unified through the Diffusion Threshold Model of decision making.

This thesis also aimed to investigate the factors that may make the trial by jury process unfair for the both the defence and the prosecution/state. First, it was found that thresholds promoted conformation bias, meaning that jurors who reach a Guilty threshold early on in a trial may become biased against the defence, whereas jurors who reach a Not Guilty threshold may become biased against the prosecution. In addition, the finding that thresholds promoted confirmation bias has implications for the legal system; jurors should be informed of the negative influences that pre-decisional verdict preferences may

have upon their decision making. Second, it was found that individuals that were categorised within the pro-defence bias group gave significantly lower perceptions of guilt in relation to the defendant in comparison to the other groups (neutral group and pro-prosecution group), thus highlighting that jurors may enter a trial biased against a particular stance (i.e., the prosecution) and this may make the trial by jury process unfair for legal actors, such as the prosecution. This result may highlight that screening tools should be used to increase the fairness of these trials. In summary, the research conducted in the current thesis has shown that a number of factors (i.e., thresholds and pre-trial biases) may make the trial by jury process unfair for legal actors (i.e., the prosecution and the defendant). However, the knowledge gained from the current study may help the legal system to counteract these factors (e.g., the legal system could use the results of this paper to inform jurors about the dangers of reaching a threshold too early).

The research in this thesis also showed that jurors in the three-verdict condition gave significantly fewer Not Guilty verdicts in comparison to jurors in the two-verdict condition. This finding has theoretical implications, as it suggests that the rational choice model cannot explain juror decision processes; and, practical implications, as the inclusion of the Not Proven verdict may allow jurors to communicate their belief of guilt better to judges. Furthermore, these results have implications for both decision scientists and policy makers.

In conclusion, the current thesis has highlighted that the Diffusion Threshold Model of decision making can be used to describe the process of how jurors reach verdicts, and that certain factors, such as thresholds and pre-trial biases, may have a negative impact on the fairness of juror decision making (i.e., said factors may bias jurors against once of the stances; prosecution and defence). However, the knowledge of these factors may allow measures to be put in place to increase the fairness of juror decision making. Future

research should extend the current thesis into investigating jury, as opposed to juror, decision making.

7. References

Aitken, C. G., & Taroni, F. (2004). *Statistics and the evaluation of evidence for forensic scientists*. Chichester, England: Wiley.

Andersson, P., Ekman, M., & Edman, J. (2003). Forecasting the fast and frugal way: A study of performance and information-processing strategies of experts and non-experts when predicting the World Cup 2002 in soccer. *Working Paper Series in Business Administration, 2003* (9), 1-26. Retrieved from: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.472.245&rep=rep1&type=pdf

Arkes, H. R., & Mellers, B. A. (2002). Do juries meet our expectations*? Law and Human Behavior*, 26(6), 625-639. doi:10.1023/A:1020929517312

Arkes, H. R., Wortmann, R. L., Saville, P. D., & Harkness, A. R. (1981). Hindsight bias among physicians weighing the likelihood of diagnoses. *Journal of Applied Psychology, 66*(2), 252-254. doi: 10.1037/0021-9010.66.2.252

Ashill, N. J., & Yavas, U. (2006). Vignette development: An exposition and illustration. *Innovative Marketing, 2*(1), 28-36. Retrieved from: https://businessperspectives.org/component/option,com_journals/task,journal/id,5/Itemid,74/

Ask, K., & Granhag, P. A. (2005). Motivational sources of confirmation bias in criminal investigations: The need for cognitive closure. *Journal of Investigative Psychology and Offender Profiling*, *2* (1), 43-63. doi:10.1002/jip.19

Ask, K., Rebelius, A., & Granhag, P. A. (2008). The "elasticity" of criminal evidence: A Moderator of Investigator Bias. *Applied Cognitive Psychology*, *22* (1), 1245–1259. doi: 10.1002/acp.1432

Ballinger, G. A. (2004). Using generalized estimating equations for longitudinal data analysis. *Organizational Research Methods, 7* (2), 127–150. doi:10.1177/1094428104263672.

Bell, B. E., & Loftus, E. F. (1985). Vivid persuasion in the courtroom. *Journal of Personality Assessment*, *49*(6), 659-664. doi:10.1207/s15327752jpa4906_16

Bergert, F. B., & Nosofsky, R. M. (2007). A response-time approach to comparing generalized rational and take-the-best models of decision making. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 33* (1), 107-129. doi:10.1037/0278-7393.33.1.107

Bhatia, S. (2014). Confirmatory search and asymmetric dominance. *Journal of Behavioral Decision Making, 27* (5), 468-476. doi: 10.1002/bdm.1824

Bitzer, S., Park, H., Blankenburg, F., & Kiebel, S. J. (2014). Perceptual decision making: drift-diffusion model is equivalent to a Bayesian model. *Frontiers in human neuroscience*, *8*, 1 – 17. doi:10.3389/fnhum.2014.00102

Blackstone, W. (1962). *Commentaries on the laws of England of public wrongs*. Boston, MA: Beacon Press. (Originally published, 1769).

Block, R. A., & Harper, D. R. (1991). Overconfidence in estimation: Testing the anchoring-and-adjustment hypothesis. *Organizational behavior and human decision processes*, *49*(2), 188-207. doi: 10.1016/0749-5978(91)90048-X

Bodenhausen, G. V. (1988). Stereotypic biases in social decision making and memory: Testing process models of stereotype use. *Journal of personality and social psychology*, *55*(5), 726-737. doi:10.1037/0022-3514.55.5.726.

Bogacz, R., Brown, E., Moehlis, J., Holmes, P., & Cohen, J. D. (2006). The physics of optimal decision making: a formal analysis of models of performance in two-alternative forced-choice tasks. *Psychological review*, *113* (4), 700-765. doi: 10.1037/0033-295X.113.4.700

Bornstein, B. H., Miller, M. K., Nemeth, R. J., Page, G. L., & Musil, S. (2005). Juror reactions to jury duty: perceptions of the system and potential stressors. *Behavioral sciences & the law, 23* (3), 321-346. doi: 10.1002/bsl.635

Borum, R., Otto, R., & Golding, S. (1993). Improving clinical judgment and decision making in forensic evaluation. *Journal of Psychiatry and Law*, 21, 35-76. doi:10.1177/009318539302100104

Broadbridge, S. (2009). *The "Not Proven" verdict in Scotland* (UK Parliamentary Briefing Papers No. SN02710). London, England: UK Houses of Parliament.

Bröder, A. (2000). Assessing the empirical validity of the" take-the-best" heuristic as a model of human probabilistic inference. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *26*(5), 1332-1346. doi:10.1037/0278-7393.26.5.1332

Bröder, A., & Gaissmaier, W. (2007). Sequential processing of cues in memory-based multiattribute decisions. *Psychonomic Bulletin & Review, 14* (5), 895-900. doi:10.3758/BF03194118

Bröder, A., & Newell, B. R. (2008). Challenging some common beliefs: Empirical work within the adaptive toolbox metaphor. *Judgment and Decision Making, 3* (3), 205-214. Retrieved from: https://search.proquest.com/?accountid=16607

Bröder, A., & Schiffer, S. (2003a). Bayesian strategy assessment in multi-attribute decision making. *Journal of Behavioral Decision Making, 16* (3), 193–213. doi: 10.1002/bdm.442

Bröder, A., & Schiffer, S. (2003b). Take the best versus simultaneous feature matching: Probabilistic inferences from memory and effects of representation format. *Journal of Experimental Psychology: General, 132* (2), 277-293. doi:10.1037/0096-3445.132.2.277

Brown, N., & Tan, S. (2011). Magnitude comparison revisited: An alternative approach to binary choice under uncertainty. *Psychonomic Bulletin & Review, 18* (2), 392-398. doi:10.3758/s13423-011-0057-1

Brown, S. D., & Heathcote, A. (2008). The simplest complete model of choice response time: linear ballistic accumulation. *Cognitive psychology, 57* (3), 153-178. doi:10.1016/j.cogpsych.2007.12.002

Burke, A. (2006). Neutralizing cognitive bias: An invitation to prosecutors. *NYUJL & Liberty, 2,* 512-530. Retrieved from: http://scholarlycommons.law.hofstra.edu/faculty_scholarship/671

Busemeyer, J. R., & Townsend, J. T. (1993). Decision field theory: a dynamic-cognitive approach to decision making in an uncertain environment. *Psychological review*, *100* (3), 432-259. doi:10.1037/0033-295X.100.3.432

Cacioppo, J. T., Petty, R. E., Feinstein, J. A., & Jarvis, W. B. G. (1996). Dispositional differences in cognitive motivation: The life and times of individuals varying in need for cognition. *Psychological bulletin*, *119*(2), 197 – 253. doi:10.1037/0033-2909.119.2.197

Cader, R., Campbell, S., & Watson, D. (2005). Cognitive continuum theory in nursing decision-making. *Journal of Advanced Nursing*, *49* (4), 397-405. doi:10.1111/j.1365-2648.2004.03303.x

Cargill, N. (2016, December 21). *Confirmation Bias and the Law*. Retrieved from: http://nataliecargill.com/

Carlson, K. A., & Russo, J. E. (2001). Biased interpretation of evidence by mock jurors. *Journal of Experimental Psychology: Applied*, *7* (2), 91-103. doi:10.1037//1076-898X.7.2.91

Cedrus Corporation (2014). Superlab 5 [computer software]. San Pedro, LA: Cedrus Corporation.

Chambliss, W. J., & Seidman, R. B. (1971). *Law, order, and power*. Reading, MA: Addison-Wesley.

Chapman, G. B., & Bornstein, B. H. (1996). The more you ask for, the more you get: Anchoring in personal injury verdicts. *Applied cognitive psychology*, *10* (6), 519-540. doi: 10.1002/(SICI)1099-0720(199612)10:6<519::AID-ACP417>3.0.CO;2-5

Chapman, G., & Johnson, E. (1999). Anchoring, activation and the construction of values. *Organizational Behaviour and Human Decision Process, 79* (2), 115-153. doi: 10.1006/obhd.1999.2841

Chaxel, A. S., Russo, J. E., & Kerimi, N. (2013). Preference-driven biases in decision makers' information search and evaluation. *Judgment and Decision Making, 8* (5), 561-576. Retrieved from: http://search.proquest.com/?accountid=16607

Cheikes, B. A., Brown, M. J., Lehner, P. E., & Adelman, L. (2004). Confirmation bias in complex analyses. *MITRE Center for Integrated Intelligence Systems*. 1-23. doi: 10.1109/TSMCA.2008.918634

Connolly, T. (2000). Decision theory, reasonable doubt, and the utility of erroneous acquittals. In T. Connolly, H. Arkes, & K. Hammond (Eds.), *Judgment and decision making: An Interdisciplinary Reader* (Chapter 14; 2nd ed). London, England: Cambridge University Press.

Council of Europe. (2010). *European Convention of Human Rights* (Protocol 14). Strasberg, Germany: Council of Europe.

Criminal Justice System (2002). *Justice for All* (No. CM 5563). London, England: Criminal Justice System. Retrieved from: https://www.cps.gov.uk/publications/docs/jfawhitepaper.pdf

Cummins, D. (2012). *Good thinking: Seven powerful ideas that influence the way we think.* London, England: Cambridge University press.

Curley, L., Allahverdi, D., MacLean, R., & Murray, J. (unpublished). Integration and information in jurors.

Dawes, R. M. (1979). The robust beauty of improper linear models in decision making. *American psychologist, 34* (7), 571-582. doi:10.1037/0003-066X.34.7.571

De La Fuente, L., De La Fuente, I., & García, J. (2003). Effects of pretrial juror bias, strength of evidence and deliberation process on juror decisions: new validity evidence of the Juror Bias Scale scores. *Psychology, Crime & Law, 9* (2), 197-209. doi: 10.1080/1068316031000116283.

De Martino, B., Kumaran, D., Seymour, B., & Dolan, R. J. (2006). Frames, biases, and rational decision-making in the human brain. *Science, 313*(5787), 684-687. doi:10.1126/science.1128356

Dhami, M. K. (2003). Psychological models of professional decision making. *Psychological Science*, *14*(2), 175-180. doi: 10.1111/1467-9280.01438

Dhami, M. K., & Ayton, P. (2001). Bailing and jailing the fast and frugal way. *Journal of Behavioral Decision Making, 14* (2), 141-168. doi:10.1002/bdm.371

Dhami, M. K., Hertwig, R., & Hoffrage, U. (2004). The role of representative design in an ecological approach to cognition. *Psychological bulletin, 130* (6), 959-988. doi:10.1037/0033-2909.130.6.959

Dhami, M., & Harries, C. (2010). Information search in heuristic decision making. *Applied Cognitive Psychology, 24* (4), 571-586. doi: 10.1002/acp.1575

Diamond, S. S. (1993). Instructing on death: Psychologists, juries, and judges. *American Psychologist, 48*, 423-434. doi:10.1037/0003-066X.48.4.423

Diamond, S. S. (1997). Illuminations and shadows from jury simulations. *Law and Human Behavior, 21* (5), 561-571. doi: 10.1023/A:1024831908377

Dougherty, M. R., Franco-Watkins, A. M., & Thomas, R. (2008). Psychological plausibility of the theory of probabilistic mental models and the fast and frugal heuristics. *Psychological Review, 115* (1), 199-213. doi:10.1037/0033-295X.115.1.199

Dror, I. (2016). A hierarchy of expert performance. *Journal of Applied Research in Memory and Cognition, 5*(8), 121-127. doi: 10.1016/j.jarmac.2016.03.001

Duff, P. (1999). The Scottish criminal jury: A very peculiar institution. *Law and Contemporary Problems*, *62*(2), 173-201. Retrieved from: http://www.jstor.org/

Elliot, A. J., & Devine, P. G. (1994). On the motivational nature of cognitive dissonance: Dissonance as psychological discomfort. *Journal of personality and social psychology, 67* (3), 382-394. doi:10.1037/0022-3514.67.3.382

Englich, B., Mussweiler, T., & Strack, F. (2005). The last word in court - A hidden disadvantage for the defence. *Law and Human Behavior*, *29*(6), 705-722. doi:10.1007/s10979-005-8380-7

Epley, N., & Gilovich, T. (2006). The anchoring-and-adjustment heuristic why the adjustments are insufficient. *Psychological science*, *17*(4), 311-318. Retrieved from: http://journals.sagepub.com/home/pss

Esqueda, C. W., Espinoza, R. K., & Culhane, S. E. (2008). The effects of ethnicity, ses, and crime status on juror decision making a cross-cultural examination of European American and Mexican American mock jurors. *Hispanic Journal of Behavioral Sciences, 30* (2), 181-199. doi: 10.1177/0739986308315319

Estrada-Reynolds, V., Gray, J., & Nuñez, N. (2015). Information integration theory, juror bias, and sentence recommendations captured over time in a capital trial. *Applied Cognitive Psychology, 29* (7). 713–722. doi: 10.1002/acp.3155

Evans, J. S. B. (2003). In two minds: Dual-process accounts of reasoning. *Trends in cognitive sciences, 7* (10), 454-459. doi:10.1016/j.tics.2003.08.012

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior research methods*, *39*(2), 175-191. doi:10.3758/BF03193146

Fenton, N., Neil, M., & Lagnado, D. A. (2013). A general structure for legal arguments about evidence using Bayesian networks. *Cognitive science, 37* (1), 61-102. doi:10.1111/cogs.12004

Fiedler, K., & von Sydow, M. (2015). Heuristics and biases: Beyond Tversky and Kahneman's (1974) judgment under uncertainty. In M. W. Eysenck & D. Groome (Eds.), *Cognitive psychology: Revisiting the classical studies* (pp. 146-161). London, UK: Sage.

Field, A. (2013). *Discovering statistics using IBM SPSSS statistics* (4 ed.). London, England: Sage Publications.

Findley, K. A., & Scott, M. S. (2006). The multiple dimensions of tunnel vision in criminal cases. *Wisconsin Law Review*, *2*, 1-107. Retrieved from: http://wisconsinlawreview.org/

Franks, N. R., Dornhaus, A., Fitzsimmons, J. P., & Stevens, M. (2003). Speed versus accuracy in collective decision making. *Proceedings of the Royal Society of London B: Biological Sciences, 270* (1532), 2457-2463. doi: 10.1098/rspb.2003.2527

Gigerenzer, G. (1991). How to make cognitive illusions disappear: Beyond "heuristics and biases". *European Review of Social Psychology, 2*, 83-115.

Gigerenzer, G. (2002). *Adaptive thinking: Rationality in the real world* (evolution and cognition series). Oxford, England: Oxford University press.

Gigerenzer, G., & Brighton, H. (2009). Homo heuristicus: Why biased minds make better inferences. *Cognitive Science, 1*, 107–143. doi:10.1111/j.1756-8765.2008.01006.x

Gigerenzer, G., & Goldstein, D. (1996). Reasoning the fast and frugal way: Models of bounded rationality. *Psychological review, 103* (4), 650- 669. doi: 10.1037/0033-295X.103.4.650

Gigerenzer, G., & Goldstein, D. G. (1999). *Betting on one good reason: Take the best and its relatives*. Simple Heuristics that Make Us Smart. New York, NY: Oxford University Press.

Gigerenzer, G., Hoffrage, U., & Kleinbölting, H. (1991). Probabilistic mental models: A Brunswikian theory of confidence. *Psychological review*, *98*(4), 506-528. doi: 10.1037/0033-295X.98.4.506

Gliem, J. A., & Gliem, R. R. (2003). Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales. *Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education, The Ohio State University.* 1-7. Retrieved from: http://hdl.handle.net/1805/344

Glöckner, A., & Betsch, T. (2012). Decisions beyond boundaries: When more information is processed faster than less. *Acta psychologica, 139* (3), 532-542. doi:10.1016/j.actpsy.2012.01.009

Gold, J. I., & Shadlen, M. N. (2007). The neural basis of decision making. *Annual Review of Neuroscience, 30*, 535-574. doi: 10.1146/annurev.neuro.29.051605.113038.

Goldhill, O. (2014, September 4). When innocent men go to jail: Miscarriages of justice in Britain. *The Telegraph*, retrieved from: http://www.telegraph.co.uk/

Goldman, A. (2003). Simple heuristics and legal evidence. *Law Probability and Risk, 2* (3), 215-226. doi: 10.1093/lpr/2.3.215

Greene, E., & Bornstein, B. H. (2003). *Determining damages: The psychology of jury awards*. Washington: The American Psychological Association. doi: 10.1037/10464-000

Greene, E., & Bornstein, B. H. (2013). Nudging the justice system toward better decisions. *The Journal of Criminal Law and Criminology*, *103* (4), 1155-1170. Retrieved from: http://www.jstor.org/stable/43895390

Greene, E., & Loftus, E. F. (1985). When crimes are joined at trial. *Law and Human Behavior*, *9*(2), 193-2017. doi: 10.1007/BF01067051

Guthrie, C., Rachlinski, J. J., & Wistrich, A. J. (2002). Judging by heuristic-cognitive illusions in judicial decision making. *Judicature*, *86* (1), 44-50. Retrieved from: https://home.heinonline.org/

Hall, C. C., Ariss, L., & Todorov, A. (2007). The illusion of knowledge: When more information reduces accuracy and increases confidence. *Organizational Behavior and Human Decision Processes*, *103* (2), 277-290. doi:10.1016/j.obhdp.2007.01.003

Hanley, J. A., Negassa, A., Edwardes, M. D. D., & Forrester, J. E. (2003). Statistical analysis of correlated data using generalized estimating equations: An orientation. *Practice of Epidemiology, 157* (4), 364–375. doi: 10.1093/aje/kwf215

Hastie, R., Penrod, S.D., & Pennington, N. (1983). *Inside the jury*. Cambridge, MA: Harvard University Press.

Hausmann, D., & Läge, D. (2008). Sequential evidence accumulation in decision making: The individual desired level of confidence can explain the extent of information acquisition. *Judgment and Decision Making, 3* (3), 229-243.Retrieved from: https://search.proquest.com/?accountid=16607

Heeger, D. (1997). *Signal detection theory* [class handout]. New York, NY: New York University, Psychology Department. Retrieved from: http://www.cns.nyu.edu/~david/handouts/sdt/sdt.html

Heller, K. J. (2006). The cognitive psychology of circumstantial evidence. *Michigan Law Review*, *105* (2), 241-305. Retrieved from: http://www.jstor.org/stable/40041577

Heverly, M. A., Fitt, D. X., & Newman, F. L. (1984). Constructing case vignettes for evaluating clinical judgment: An empirical model. Evaluation and Program Planning, 7, 45-55. doi:10.1016/0149-7189(84)90024-7

Hilbig, B. E. (2010). Reconsidering "evidence" for fast-and-frugal heuristics. *Psychonomic Bulletin & Review, 17* (6), 923-930. doi:10.3758/PBR.17.6.923

Hoffmann, J. A., von Helversen, B., & Rieskamp, J. (2013). Deliberation's blindsight how cognitive load can improve judgments. *Psychological science*, *24* (6), 869-879. doi:10.1177/0956797612463581

Hong, J., & OttoBoni, K. (2017, May). Generalised Estimating Equations. Retrieved from: https://rlbarter.github.io/Practical-Statistics/2017/05/10/generalized-estimating-equations-gee/

Hope, L., Greene, E., Memon, A., Gavisk, M., & Houston, K. (2008). A third verdict option: Exploring the impact of the Not Proven verdict on mock juror decision making. *Law and human behavior*, *32* (3), 241-252. doi:10.1007/s10979-007-9106-8

IBM knowledge Center (2017). Using Generalized Estimating Equation to fit a Repeated Measures Logistic Regression. Retrieved from: https://www.ibm.com/support/knowledgecenter/en/SSLVMB_22.0.0/com.ibm.spss.statistics.help/spss/advanced/idh_idd_gee_repeated.htm

IBM Software Group (2013). IBM SPSS Advanced Statistics 22. Chaciago, Il: ATTN: Licensing. Retrieved from: http://www.sussex.ac.uk/its/pdfs/SPSS_Advanced_Statistics_22.pdf

Idre (2017). *Ordinal Logistic Regression*. Retrieved from: https://stats.idre.ucla.edu/spss/dae/ordinal-logistic-regression/

Jackson, B. S. (1998). Truth or proof?: The criminal verdict. *Revue internationale de semiotique juridique*, *11*(3), 227-273. doi:10.1007/BF01110409.

Jang, M. (2011). Working correlation selection in generalized estimating equations. *Iowa Research Online,* 1-259. Retrieved from: http://ir.uiowa.edu/etd/2719

Jonas, E., Schulz-Hardt, S., Frey, D., & Thelen, N. (2001). Confirmation bias in sequential information search after preliminary decisions: An expansion of dissonance theoretical research on selective exposure to information. *Journal of personality and social psychology, 80* (4), 557-571. doi:10.103700022-3514.80.4.557

Jones, C. S., & Kaplan, M. F. (2003). The effects of racially stereotypical crimes on juror decision-making and information-processing strategies. *Basic and Applied Social Psychology, 25* (1), 1-13. doi: 10.1207/S15324834BASP2501_1

Jones, M., & Sugden, R. (2001). Positive confirmation bias in the acquisition of information. *Theory and Decision*, *50* (1), 59-99.doi: 10.1023/A:1005296023424

Kahan, D. (2015). Laws of cognition and the cognition of law. *Cognition, 135,* 56-60. doi: 10.1016/j.cognition.2014.11.025

Kalven, H., Jr., & Zeisel, H. (1966). *The American jury.* Boston: Little, Brown.

Kaplan, M. F., & Kemmerick, G. D. (1974). Juror judgment as information integration: Combining evidential and nonevidential information. Journal of Personality and Social psychology, 30(4), 493-499. doi:10.1037/h0037034

Kaplan, M. F., & Miller, L. E. (1978). Reducing the effects of juror bias. *Journal of Personality and Social Psychology*, *36*(12), 1443-1455. doi:10.1037/0022-3514.36.12.1443

Kassin, S. M., & Wrightsman, L. S. (1983). The construction and validation of a juror bias scale. *Journal of Research in Personality*, *17*(4), 423-442. doi:10.1016/0092-6566(83)90070-3

Keppel, G., & Wickens, T.D. (2004). *Design and analysis: A researchers handbook* (4rd Edition). Upper Saddle River, NJ: Pearson.

Kerr, N. (1993). Stochastic models of juror decision making. In R. Hastie (Ed), *Inside the Juror: The Psychology of Juror Decision Making* (chapter 5). London, England: Cambridge University Press.

Klein, G. (2001). *Sources of power: How people make decisions*. Cambridge: Massachusetts Institute of Technology.

Korobkin, R. B., & Ulen, T. S. (2000). Law and behavioral science: Removing the rationality assumption from law and economics. *California Law Review*, 1051-1144. Retrieved from: http://www.jstor.org/stable/3481255

Laerd Statistics (2017). *One-way ANOVA (Cont…)*. Retrieved from: https://statistics.laerd.com/

Laming, D. R. J. (1968). *Information theory of choice reaction time.* New York, NY: Wiley.

LaRosa, P. (2014, August 1). *Juror's insights on David Camm acquittal at 3rd murder trial*. Retrieved from: http://www.cbsnews.com/

Laudan, L. (2010). Need verdicts come in pairs? *International Journal of Evidence and Proof*, *14* (1), 1-24. doi:10.1350/ijep.2010.14.1.338

Lecci, L., & Myers, B. (2008). Individual differences in attitudes relevant to juror decision making: development and validation of the pretrial juror attitude questionnaire (PJAQ) 1. *Journal of Applied Social Psychology*, *38*(8), 2010-2038. doi: 10.1111/j.1559-1816.2008.00378.x

Lecci, L., & Myers, B. (2009). Predicting guilt judgments and verdict change using a measure of pretrial bias in a videotaped mock trial with deliberating jurors. *Psychology, Crime & Law, 15* (7), 619-634. doi: 10.1080/10683160802477757

Lecci, L., Snowden, J., & Morris, D. (2004). Using social science research to inform and evaluate the contributions of trial consultants in the voir dire. *Journal of forensic psychology practice, 4*(2), 67-78. doi: 10.1300/J158v04n02_04

Lee, M. D., & Cummins, T. D. (2004). Evidence accumulation in decision making: Unifying the "take the best" and the "rational" models. *Psychonomic Bulletin & Review*, *11* (2), 343-352. doi: 10.3758/BF03196581

Lee, M. D., & Dry, M. J. (2006). Decision making and confidence given uncertain advice. *Cognitive Science*, *30* (6), 1081-1095. doi:10.1207/s15516709cog0000_71

Lee, M. D., Newell, B. R., & Vandekerckhove, J. (2014). Modeling the adaptation of search termination in human decision making. *Decision, 1* (4), 223-251. doi:10.1037/dec0000019

Lemieux, J. M. (2007). The relationship between beliefs, strength of evidence, statistical presentation, and expert testimony on jury decision-making in DNA cases (Doctoral dissertation, Carleton University Ottawa).

Link, S. W., & Heath, R. A. (1975). A sequential theory of psychological discrimination. *Psychometrika, 40* (1), 77-105. doi:10.1007/BF0229148

Lower, S. (2008, March). *Pseudoscience: What is it? How can I recognize it?* Retrieved from: http://www.chem1.com/acad/sci/pseudosci.html

Ludwig, C (2011). Saccadic decision making. In S. Liversedge, I. Gilchrist, S. Everling (*Eds.*), *The oxford handbook of eye movements* (PP.425 -439). New York, NY: Oxford University Press.

MacCoun, R. J. (1989). Experimental research on jury decision-making. *Science, 244* (4908), 1046-1050. Retrieved from: http://www.jstor.org/

Machina, M. J. (1982). " Expected Utility" Analysis without the Independence Axiom. *Econometrica, 50* (2), 277-323. doi:10.2307/1912631

Maeder, E., Yamamoto, S., & Saliba, P. (2015). The influence of defendant race and victim physical attractiveness on juror decision-making in a sexual assault trial. *Psychology, Crime & Law, 21* (1), 62-79, doi: 10.1080/1068316X.2014.915325

Manktelow, K. (2004). Reasoning and Rationality: The pure and the practical. In K. Manktelow & M. Cheung Chung (Eds.), *Psychology of reasoning: Theoretical and historical Perspective* (pp.157-175). East Sussex, England: Psychology press.

Marshall, C. R., & Wise, J. A. (1975). Juror decisions and the determination of guilt in capital punishment cases. In D. Wendt & C. Vlek (Eds.), *Utility, probability, and human decision making* (pp. 257–270). Dordrecht, The Netherlands: Reidel.

McAuliff, B. D., & Kovera, M. B. (2008). Juror need for cognition and sensitivity to methodological flaws in expert evidence. *Journal of Applied Social Psychology*, *38*(2), 385-408.doi: 10.1111/j.1559-1816.2007.00310.x

McFarlane, B. A., & Cordner, S. M. (2008). Wrongful convictions: The effect of tunnel vision and predisposing circumstances in the criminal justice system. Ontario, Canada: Government of Ontario.

McGraw, B. D., Farthing-Capowich, D., & Keilitz, I. (1985). The guilty but mentally ill plea and verdict: Current State of the knowledge. *Villanova Law Review*, *30* (1), 117 – 191.

Mehlhorn, K., Ben-Asher, N., Dutt, V., & Gonzalez, C. (2014). Observed variability and values matter: Toward a better understanding of information search and decisions from experience. *Journal of Behavioral Decision Making, 27* (4), 328-339. doi: 10.1002/bdm.1809

Mercier, H., & Sperber, D. (2011). Why do humans reason? Arguments for an argumentative theory. *Behavioral and Brain Sciences, 34,* 57-73. doi: 10.1017/S0140525X10000968

Merkle, E. C., & Van Zandt, T. (2006). An application of the Poisson race model to confidence calibration. *Journal of Experimental Psychology: General*, *135* (3), 391-408. doi:10.1037/0096-3445.135.3.391

Miles, M.B. & Huberman, A.M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook*. Thousand Oaks, CA: SAGE Publications.

Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological review, 63* (2), 81-97. doi: 10.1037/h0043158

Miller, M. K., Maskaly, J., Green, M., & Peoples, C. D. (2011). The effects of deliberations and religious identity on mock jurors' verdicts. *Group Processes & Intergroup Relations*, 1-16. doi: 10.1177/1368430210377458

Milosavljevic, M., Malmaud, J., Huth, A., Kochand, C., & Rangel, A. (2010). The drift diffusion model can account for the accuracy and reaction time of value-based choices under high and low time pressure. *Judgment and Decision Making*, *5* (6), 437–449. Retrieved from: https://www.ssrn.com/en/

Mobely, S. (2007). *Identifying juror bias: Using the pretrial juror attitude questionnaire for more effective voir dire.* Arlington, TX: ProQuest.

Montgomery, H. (1983). Decision rules and the search for a dominance structure: Towards a process model of decision making. Advances in psychology, *14* (5), 343-369. doi: 10.1016/S0166-4115(08)62243-8Get

Moohr, G. S. (2004). Prosecutorial power in an adversarial system: Lessons from current white collar cases and the inquisitorial model. *Buffalo Criminal Law Review*, *8*(1), 165-220. Retrieved from: http://www.jstor.org/stable/10.1525/nclr.2004.8.1.165

Munier, B., Selten, R., Bouyssou, D., Bourgine, P., Day, R., Harvey, N., & Wensley, R. (1999). Bounded rationality modeling. *Marketing Letters, 10* (3), 233-248. doi: 10.1023/A:1008058

Murray, J. & Thomson, M. E. (2010). Applying decision making theory to clinical judgments of violence risk assessment. *Europe's Journal of Psychology [online], 2010(2)*, 150-171. Retrieved from: http://ejop.psychopen.eu/index.php/ejop.

Murray, J., Williams, B., Hoskins, G., Skar, S., McGhee, J., Treweek, S., & Cameron, L. (2016). A theory-informed approach to developing visually mediated interventions to change behaviour using an asthma and physical activity intervention exemplar. *Pilot and Feasibility Studies*, *2 (*46), 1- 17. doi: 10.1186/s40814-016-0091-x

Naughton, M. (2003). How big is the iceberg? A zemiological approach to quantifying miscarriages of justice. *Radical Statistics*, *81*(5), 5-17. Retrieved from: http://www.radstats.org.uk/no081/naughton.pdf

Newell, B. R. (2005). Re-visions of rationality? *Trends in cognitive sciences*, *9* (1), 1-15. doi:10.1016/j.tics.2004.11.005

Newell, B. R., & Bröder, A. (2008). Cognitive processes, models and metaphors in decision research. *Judgment and Decision Making, 3* (3), 195-204. Retrieved from: http://EconPapers.repec.org/RePEc:jdm:journl:v:3:y:2008:i::p:195-204

Newell, B. R., & Lee, M. D. (2009). Learning to adapt evidence thresholds in decision making. In *Proceedings of the 31st Annual Conference of the Cognitive Science Society. Austin, TX: Cognitive Science Society*. 473-478. Retrieved from: http://csjarchive.cogsci.rpi.edu/proceedings/2009/papers/85/paper85.pdf

Newell, B. R., & Lee, M. D. (2010). The right tool for the job? Comparing an evidence accumulation and a naive strategy selection model of decision making. *Journal of Behavioral Decision Making, 24* (5), 456–481.doi:10.1002/bdm.703

Newell, B. R., Collins, P., & Lee, M. D. (2007). Adjusting the spanner: Testing an evidence accumulation model of decision making. In *Proceedings of the 29th Annual Conference of the Cognitive Science Society* (pp. 533-538). Cognitive Science Society Austin, TX. Retrieved from: http://escholarship.org/

Newell, B. R., Rakow, T., Weston, N. J., & Shanks, D. R. (2004). Search strategies in decision making: The success of "success". *Journal of Behavioral Decision Making, 17,* 117–137. doi:10.1002/bdm.465

Newell, B. R., Weston, N. J., & Shanks, D. R. (2003). Empirical tests of a fast-and-frugal heuristic: Not everyone "takes-the-best". *Organizational Behavior and Human Decision Processes,* 91 (1), 82-96.doi:10.1016/S0749-5978(02)00525-3

Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of general psychology*, *2* (2), 175- 220. doi:10.1037/1089-2680.2.2.175

Northcraft, G., & Neale, M. (1987). Experts, amateurs, and real estate: An anchoring-and-adjustment perspective on property pricing decisions. *Organisational Behaviour and Human Decision Process, 84,* 87-93. doi:10.1016/0749-5978(87)90046-X

Nygren, T. E., & White, R. J. (2002, September). Assessing individual differences in decision making styles: Analytical vs. intuitive. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (Vol. 46, No. 12, pp. 953-957). Los Angeles, CA: SAGE Publications. doi:10.1177/154193120204601204

Orr, D., & Guthrie, C. (2005). Anchoring, information, expertise, and negotiation: New insights from meta-analysis. *Ohio St. J. on Disp. Resol.*, *21*, 597-628. Retreived from: https://home.heinonline.org/

Ostrom, T. M., Werner, C., & Saks, M. J. (1978). An integration theory analysis of jurors' presumption of guilt or innocence. *Journal of Personality and Social Psychology*, *36*, 436–450. doi:10.1037/0022-3514.36.4.436

Pan, W., & Connett, J. (2002). Selecting the working correlation structure in generalized estimating equations with application to the lung health study. *Statistica Sinica 12,* 475-490. Retrieved from: http://www3.stat.sinica.edu.tw/statistica/oldpdf/A12n26.pdf

Park, K., Seong, Y., Kim, M., & Kim, J. (2016). Juror adjustments to the reasonable doubt standard of proof. *Psychology, Crime & Law*, 1-20. doi: 10.1080/1068316X.2016.1168427

Pennington, N., & Hastie, R. (1981). Juror decision-making models: The generalization gap. *Psychological Bulletin*, *89*(2), 246- 287. doi: 10.1037/0033-2909.89.2.246

Pennington, N., & Hastie, R. (1986). Evidence evaluation in complex decision making. *Journal of Personality and Social Psychology*, *51*, 242– 258. doi:10.1037/0022-3514.51.2.242

Pennington, N., & Hastie, R. (1992). Explaining the evidence: Tests of the story model for juror decision making. *Journal of Personality and Social Psychology*, *62*, 189–206.doi: 10.1037/0022-3514.62.2.189

Peterson, D. K., & Pitz, G. F. (1986). Effects of amount of information on predictions of uncertain quantities. *Acta psychologica*, *61* (3), 229-241. doi:10.1016/0001-6918(86)90083-1

Pezdek, K., Avila-Mora, E., & Sperry, K. (2010). Does trial presentation medium matter in jury simulation research? Evaluating the effectiveness of eyewitness expert testimony. *Applied Cognitive Psychology, 24* (5), 673-690. doi:10.1002/acp.1578

Potter, K. W. (2011). *When you are confident that you are wrong: Response reversals and the expanded Poisson race model* (doctoral dissertation, The Ohio State University). Retrieved from: https://etd.ohiolink.edu/pg_10?0::NO:10:P10_ACCESSION_NUM:osu1321454142.

Powell, L. F. (1966). Jury trial of crimes. *Washington and Lee Law Review,23* (1), 1-11. Retrieved from: http://scholarlycommons.law.wlu.edu/wlulr/?utm_source=scholarlycommons.law.wlu.edu%2F wlulr%2Fvol23%2Fiss1%2F2&utm_medium=PDF&utm_campaign=PDFCoverPages

Pozzulo, J. D., Dempsey, J., Maeder, E., & Allen, L. (2010). The effects of victim gender, defendant gender, and defendant age on juror decision making. *Criminal Justice and Behavior*, *37*(1), 47-63. doi:10.1177/0093854809344173

Price, H. L., & Dahl, L. C. (2014). Order and strength matter for evaluation of alibi and eyewitness evidence. *Applied Cognitive Psychology*, *28* (2), 143-150. doi:10.1002/acp.2983

Pritchard, M. E., & Keenan, J. M. (2002). Does jury deliberation really improve jurors' memories? *Applied Cognitive Psychology, 16* (5), 589-601. doi:10.1002/acp.816

Quas, J. A., Bottoms, B. L., Haegerich, T. M., & Nysse-Carris, K. L. (2002). Effects of victim, defendant, and juror gender on decisions in child sexual assault cases. *Journal of Applied Social Psychology*, *32*(10), 1993-2021. doi:10.1111/j.1559-1816.2002.tb02061.x

Rachlinski, J. J. (2000). Heuristics and biases in the courts: ignorance or adaptation. *Oregon Law Review*, *79*, 61 – 102. Retrieved from: http://scholarship.law.cornell.edu/facpub/810?utm_source=scholarship.law.cornell.edu%2Ffacpub%2F810&utm_medium=PDF&utm_campaign=PDFCoverPages

Ramsey, R. J., & Frank, J. (2007). Wrongful conviction perceptions of criminal justice professionals regarding the frequency of wrongful conviction and the extent of system errors. *Crime & Delinquency*, *53*(3), 436-470. doi:10.1177/0011128706286554

Ratcliff, R., & McKoon, G. (2008). The diffusion decision model: Theory and data for two-choice decision tasks. *Neural computation*, *20* (4), 873-922. doi:10.1162/neco.2008.12-06-420

Ratcliff, R., & Rouder, J. N. (1998). Modeling response times for two-choice decisions. *Psychological Science, 9* (5), 347-356. doi:10.1111/1467-9280.00067

Ratcliff, R., & Smith, P. L. (2004). A comparison of sequential sampling models for two-choice reaction time. *Psychological review*, *111* (2), 333-267. doi: 10.1037/0033-295X.111.2.333

Ratcliff, R., Philiastides, G, & Sajda, P. (2009). Quality of the evidence for perceptual decision making is indexed by trial-to-trial variability of the EEG. *Proceedings of the National Academy of Sciences, 106* (16), 6539-6544. doi:10.1073/pnas.0812589106

Romer, D., Jamieson, K. H., & Aday, S. (2003). Television news and the cultivation of fear of crime. *Journal of communication*, *53*(1), 88-104. doi: 10.1111/j.1460-2466.2003.tb03007.x

Rouder, J. N. (2001). Testing evidence accrual models by manipulating stimulus onset. *Journal of Mathematical Psychology, 45*, 334–354. doi: 10.1006/jmps.2000.1319

Runciman, V. (1993). Report of the royal commission on criminal justice. London, England: HMSO.

Ruva, C., McEvoy, C., & Bryant, J. B. (2007). Effects of pre-trial publicity and jury deliberation on juror bias and source memory errors. *Applied Cognitive Psychology, 21(*1), 45-67. doi:10.1002/acp.1254

Saks, M. J., & Risinger, M. (2003). Base rates, the presumption of guilt, admissibility rulings, and erroneous convictions. *Michigan State DCL Law Review, 4* (105), 1051-1063. Retrieved from: https://home.heinonline.org/

Sandys, M., & Dillehay, R. C. (1995). First-ballot votes, predeliberation dispositions, and final verdicts in jury trials. *Law and Human Behavior, 19,* 175-195. doi: 10.1007/BF01499324

Sanfey, A. G., & Chang, L. J. (2008). Multiple systems in decision making. *Annals of the New York Academy of Sciences, 1128* (1), 53-62. doi:10.1196/annals.1399.007

Sangero, B., & Halpert, M. (2007). Why a conviction should not be based on a single piece of evidence: A proposal for reform. *Jurimetrics*, 43-94. Retrieved from: https://www.ssrn.com/en/

Schall, J. (2005). Decision making. *Current Biology, 15* (1), 9-11. doi: 10.1016/j.cub.2004.12.009

Schklar, J., & Diamond, S. S. (1999). Juror reactions to DNA evidence: Errors and expectancies. *Law and Human Behavior*, *23*(2), 159-184. doi: 10.1023/A:1022368801333

Schweizer, M. (2013). Comparing holistic and atomistic evaluation of evidence. *Law, Probability and Risk*, *13*(1), 65-89. doi: 10.1093/lpr/mgt013

Scottish Courts and Tribunals (2015). *Jurors.* Retrieved from: http://www.scotcourts.gov.uk/

Scottish Office (1994). *Juries and verdicts*. Edinburgh: Scottish Office.

Severance, L. J., & Loftus, E. F. (1982). Improving the ability of jurors to comprehend and apply criminal jury instructions. *Law and Society Review*, 153-197. doi: 10.2307/3053535

Shanteau, J., & Nagy, G. F. (1984). Information integration in person perception: Theory and application. In M. Cook (Ed), *Issues in person perception* (pp. 48-86). London: Methuen.

Simon, D. (2004). A third view of the black box: Cognitive coherence in legal decision making. *The University of Chicago Law Review*, 511-586. Retrieved from: http://www.jstor.org/.

Simon, H. A. (1956). Rational choice and the structure of the environment. *Psychological review*, *63* (2), 1-11. doi: 10.1037/h0042769.

Simon, H. A. (1990). Invariants of human behavior. *Annual Review of Psychology, 41,* 1–19. Retrieved from: http://www.annualreviews.org/

Smith, L. & Bull. R. (2012). Identifying and measuring juror pre-trial bias for forensic evidence: Development and validation of the forensic evidence evaluation bias scale. *Psychology, Crime & Law, 18* (9), 797-815. doi: 10.1080/1068316X.2011.561800

Smith, L., & Bull, R. (2014). Validation of the factor structure and predictive validity of the forensic evidence evaluation bias scale for robbery and sexual assault trial scenarios. *Psychology, Crime & Law, 20* (5), 450-466. doi: 10.1080/1068316X.2013.793340

Smith, P. L., & Ratcliff, R. (2004). Psychology and neurobiology of simple decisions. *Trends in neurosciences, 27* (3), 161-168. doi:10.1016/j.tins.2004.01.006

Smithson, M., Deady, S., & Gracik, L. (2007). Guilty, Not Guilty, or…? Multiple options in jury verdict choices. *Journal of Behavioral Decision Making*, *20* (5), 481-498. doi: 10.1002/bdm.572

Snook, B., & Cullen, R.M. (2008). Bounded rationality and criminal investigations: Has tunnel vision been wrongfully convicted? In D.K. Rossmo (Ed.), Criminal investigative failures (pp. 71-98). Boca Raton, FL: CRC Press.

Sojka, J. Z., & Giese, J. L. (2001). The influence of personality traits on the processing of visual and verbal information. *Marketing Letters*, *12* (1), 91-106. doi: 10.1023/A:1008132

Söllner, A., Bröder, A., Glöckner, A., & Betsch, T. (2014). Single-process versus multiple-strategy models of decision making: Evidence from an information intrusion paradigm. *Acta Psychologica, 146,* 84-96. doi: 10.1111/j.1440-1630.2009.00785.x

Sommers, S. R., & Ellsworth, P. C. (2000). Race in the courtroom: Perceptions of guilt and dispositional attributions. *Personality and Social Psychology Bulletin*, *26*(11), 1367-1379. doi:10.1177/0146167200263005

Stasser, G., Kerr, N., & Bray, R. M. (1982). The social psychology of jury deliberations: Structure, process, and product. In N. Kerr & R. M. Bray (Eds.), *The Psychology of the courtroom* (pp. 221-256). New York: Academic Press.

Strack, F., & Mussweiler, T. (1997). Explaining the enigmatic anchoring effect: Mechanisms of selective accessibility. *Journal of Personality and Social Psychology, 73* (3), 437-446. doi: 10.1037/0022-3514.73.3.437

Thagard, P. (2004). Causal inference in legal decision making: Explanatory coherence vs. Bayesian networks. *Applied Artificial Intelligence*, *18* (3-4), 231-249.doi: 10.1080/08839510490279861

Thaman, S. C. (1999). Europe's new jury systems: The cases of Spain and Russia. *Law and Contemporary Problems*, *62*(2), 233-259. doi: 10.2307/1192258

Thomas, E. A., & Hogue, A. (1976). Apparent weight of evidence, decision criteria, and confidence ratings in juror decision making. *Psychological Review, 83* (6), 442-465. doi:10.1037/0033-295X.83.6.442

Todd, P. M., & Gigerenzer, G. (2003). Bounding rationality to the world. *Journal of Economic Psychology, 24* (2), 143-165. doi: 10.1016/S0167-4870(02)00200-3

Todd, P. M., & Gigerenzer, G. (2007). Environments that make us smart ecological rationality. *Current Directions in Psychological Science, 16* (3), 167-171. doi:10.1111/j.1467-8721.2007.00497.x

Todd, P. M., & Gigerenzer, G. (2012). *Ecological rationality: Intelligence in the world*. New York, NY: Oxford University Press.

Toma, C., Gilles, I., & Butera, F. (2013). Strategic use of preference confirmation in group decision making: The role of competition and dissent. *British Journal of Social Psychology*, *52* (1), 44-63. doi: 10.1111/j.2044-8309.2011.02037.x

Tordesillas, R. S., & Chaiken, S. (1999). Thinking too much or too little? The effects of introspection on the decision-making process. *Personality and Social Psychology Bulletin*, *25* (5), 625-631. doi:10.1177/0146167299025005007

Tsai, C. I., Klayman, J., & Hastie, R. (2008). Effects of amount of information on judgment accuracy and confidence. *Organizational Behavior and Human Decision Processes*, *107* (2), 97-105. doi:10.1016/j.obhdp.2008.01.005

Tversky, A., & Kahneman, D. (1971). Belief in the Law of Small Numbers. *Psychological Bulletin, 76* (2), 105-110. doi: 10.1037/h0031322

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive psychology*, *5*(2), 207-232.doi:10.1016/0010-0285(73)90033-9

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science, New Series, 185* (9), 1124-1131. doi:10.1007/978-94-010-1834-0_8

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, *211* (4481), 453-458. doi:10.1007/978-3-642-70634-9_6

Tyler, T. R. (2006). Viewing CSI and the threshold of guilt: Managing truth and justice in reality and fiction. *The Yale Law Journal*, 1050-1085. Retrieved from: https://home.heinonline.org/

Van der Wurff, A. W. G., Chan, Y. L., Van Straalen, N. M., & Schouten, J. (2000). TE-AFLP: combining rapidity and robustness in DNA fingerprinting. *Nucleic Acids Research*, *28*(24), 105-105. doi: 10.1093/nar/28.24.e105

Van Maanen, L., & Van Rijn, H. (2007). An accumulator model of semantic interference. *Cognitive Systems Research*, *8* (3), 174-181. doi:10.1016/j.cogsys.2007.05.002

Vandekerckhove, J., & Tuerlinckx, F. (2008). Diffusion model analysis with MATLAB: A DMAT primer. *Behavior Research Methods, 40* (1), 61-72. doi: 10.3758/BRM.40.1.61

Walters, G. D. (2007). Using Poisson class regression to analyze count data in correctional and forensic psychology a relatively old solution to a relatively new problem. *Criminal Justice and Behavior*, *34* (12), 1659-1674. doi:10.1177/0093854807307030

Walters, G., Kroner, D., DeMatteo, D., & Locklair, B. (2014). The impact of base rate utilization and clinical experience on the accuracy of judgments made with the HCR-2. *Journal of Forensic Psychology Practice*, *14*, 288–301. doi:10.1080/15228932.2014.941726

Wason, P. C. (1968). Reasoning about a rule. *The Quarterly journal of experimental psychology*, *20* (3), 273-281. doi:10.1080/14640746808400161

Watt, R., & Quinn, S. (2008). It depends what you do in the laboratory. *British Journal of Psychology, 99*, 351–354. doi:10.1348/000712607X267976

Weaver, M. (2009). Introduction to analysis methods for longitudinal/clustered data, part 3: Generalized Estimating Equations [PowerPoint slides]. Retrieved from: http://www.icssc.org/Documents/AdvBiosGoa/Tab%2007.00_GEE.pdf

Weiten, W., & Diamond, S. S. (1979). A critical review of the jury simulation paradigm: The case of defendant characteristics. *Law and Human Behavior*, *3*(1-2), 71-93. doi: 10.1007/BF01039149

Wells, G. L. (1992). Naked statistical evidence of liability: Is subjective probability enough? *Journal of Personality and Social Psychology*, *6* (5), 739-752. doi:10.1037/0022-3514.62.5.739

Wetmore, S., Neuschatz, J., & Gronlund, S. (2014). On the power of secondary confession evidence. *Psychology, Crime & Law, 20* (4), 339-357. doi:10.1080/1068316X.2013.777963

Wiener, R., Krauss, D., & Lieberman, J. (2011). Mock jury research: Where do we go from here? *Behavioural Sciences and Law, 29*, 467-479.doi:10.1002/bsl.989

Williams, M. R., Demuth, S., & Holcomb, J. E. (2007). Understanding the influence of victim gender in death penalty cases: The importance of victim race, sex-related victimization, and jury decision making. *Criminology*, *45*(4), 865-891.doi:10.1111/j1745-9125.2007.00095.x

Yeung, N., & Summerfield, C. (2012). Metacognition in human decision-making: Confidence and error monitoring. *Philosphical Transactions Society, 367,* 1310-1321. doi: 10.1098/rstb.2011.0416

Zhang, J. (2012). The effects of evidence bounds on decision-making: Theoretical and empirical developments. *Frontiers in psychology, 3* (263), 1-19. doi:10.3389/fpsyg.2012.00263

Zhang, S., Lee, M. D., Vandekerckhove, J., Maris, G., & Wagenmakers, E. J. (2014). Inferring Time-varying boundaries for diffusion models of decision making and response time. *Frontiers in psychology*, *5* (12), 1-11. doi:10.3389/fpsyg.2014.01364

8. Footnote

The author of this PhD would like to acknowledge that there may be a problem with the ANOVA's used to test the efficacy of the Diffusion Threshold Model in chapter three and four in relation to the direction of causality and the reliability of the results. Nevertheless, the ANOVA's were kept in this thesis as the researcher wanted to test differences between thresholds across verdict types rather than test the direction of causality, and because using the variable of Verdict Given did not violate the assumptions of an ANOVA at the mechanical level. A generalised estimating equation (chapter three) and a binary logistic regression (chapter four) were used to add reliability and depth to the results, however.

9. Appendix A

9.1. Pilot for Third Experimental (Chapter Five)

Before the research described in Chapter Five (the final study) was carried out, piloting was conducted to establish which types of evidence (DNA evidence, expert testimony, eyewitness testimony and secondary confessions) were perceived to be the strongest and weakest, respectively. This investigation was necessary in order to develop evidence anchors for Chapter Five. This Appendix will present the methodology and findings of the pilot.

9.1.1. Method.

9.1.1.1. Design.

A within-subjects design was adopted for this inventory based study, one independent variable called evidence type (four conditions: DNA evidence; expert testimony; secondary confession; and, eyewitness testimony) was used. The dependent measure was perceived evidence strength.

9.1.1.2. Participants.

Power analysis (G*power; Faul et al., 2007) was conducted, and it was found that a sample of 60 was required for the current analysis. In total, the pilot study received 98 responses, with a total of 78 (female = 55) completed questionnaires; the mean responder age was 32.47 years ($SD = 12.19$). Seventy-seven of the participants were from the UK, and one person was from Poland. In addition, 64 of the participants were students, the sample also consisted of other occupations, including but not limited to: civil servants, hospitality workers and support workers. The inclusion/exclusion criteria were:

- Are you eligible to vote?

- Are you eligible to be on a jury?

Participants were recruited online from social media sites and websites (such as Craigslist, Gumtree, Call for participants, Facebook and Twitter).

9.1.1.3.   Materials.

9.1.1.3.1.   Novi.

Novi (a questionnaire development software) was used to create the questionnaire; the questionnaire was then distributed onto social media sites (such as Facebook) and websites (such as Gumtree).

9.1.1.3.2.   Question 1 to 20.

The types of evidence (i.e., DNA, secondary confessions, expert testimony and eyewitness testimony) used were similar, yet not exact, to Smith and Bull's (2012) research. Previous researchers have also used similar evidence types in their own studies (see Ask et al., 2008; Lemieux, 2007; Wetmore et al., 2014). In addition, the researcher of the current pilot conducted a literature review on evidence strength, which investigated how previous researchers have defined or used evidence strength within their studies (see Ask et al., 2008; Carlson & Russo, 2001; Estrada-Reynolds et al., 2015; Park, 2011; Smith & Bull, 2012; Van der Wurff, Chan, Van Straalen, & Schouten, 2000). This literature review highlighted that when previous researchers tested how participants perceived the strength of a piece of evidence, five different types of measures were used: 1) evidence accuracy; 2) evidence robustness; 3) evidence strength; 4) evidence weight; and 5) decision accuracy based on evidence. In the current study, each of these five measures

were transformed into a question type, and each of these five types of questions were asked for each of the four evidence types. Therefore, participants were asked 20 questions (and an additional one question, which will be discussed in the next section) that centred on the perceived strength of the four different evidence types mentioned above. One example of the questions/statements used in the current pilot is: "*Eyewitness testimony would not allow me to reach an accurate decision*". The participant rated each of the 20 questions/statements on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), with five questions being reverse scored due to wording to reduce the risk of response bias. The question number was kept small in the current pilot in order to be in line with other juror inventories, such as the PJAQ (Lecci & Myers, 2008).

6.3.1.3.5. Question 21.

In addition to the 20 questions that evaluated the strength of each evidence type individually, the last question (question 21) asked participants to rank each of the evidence types from strongest to weakest. Only four scores were used in the last question, with the weakest piece of evidence being scored with a one, and the strongest piece of evidence being scored with a four. Over the whole questionnaire, evidence types could be given a minimum strength rating of six, and a maximum strength rating of 29. The higher the strength rating, the stronger a type of evidence was perceived to be. The information from the pilot was then used to establish which piece of evidence would be used as the strong initial anchor, and which piece of evidence would be used as the weak initial anchor.

9.1.1.3.3.   *Demographics questionnaire.*

Participants were asked questions relating to age, employment and nationality. This was to ensure that the study had sufficient external validity.

9.1.1.3.4.   *Information sheet, consent form and debrief.*

Standardised information sheets made participants aware of the exclusion/ inclusion criteria and ethical issues (such as the right to withdraw and confidentiality). The consent forms allowed participants to consent to partaking in the pilot. Finally, the debrief forms made participants aware of the full aims of the pilot (i.e., the pilot was going to be used to design a future study).

9.1.1.4.   **Procedure.**

Participants read the information sheet, completed the consent form, and then completed the demographics questionnaire. They then read and rated each of the 21 statements/questions. Once the participants had rated each of the 21 questions, they then read through the debrief sheet.

9.1.2. Pilot results.

9.1.2.1. *Descriptive statistics for each of the four evidence types.*

Table 17 shows the descriptive statistics for each of the four evidence types tested.

Table 17

Descriptive statistics for each of the evidence types across the perceived evidence strength measure.

Evidence Type	Eyewitness Testimony	Deoxyribonucleic Acid (DNA)	Secondary Confession	Expert Testimony
Mean	17.83	24.77	13.88	19.64
Standard Deviation	4.07	3.17	3.95	3.76

Table 17 shows that DNA evidence was rated as the strongest evidence type, expert testimony from a psychologist was rated as the second strongest evidence type, eyewitness testimony was rated third as the strongest evidence type, and secondary confessions were rated as the weakest evidence type. Minimal outliers were found; therefore, it was deemed appropriate to test the pilot data using an ANOVA (Laerd Statistics, 2017).

9.1.2.2. *Internal consistency tests for each of the four evidence types.*

Four separate Cronbach's Alpha tests were used to assess the internal consistency of each of the four different evidence types; see Table 18 for the Alpha levels for each of the evidence types.

Table 18

Cronbach's Alphas for each of the evidence types.

Evidence Type	Alpha Level	Number of items	Missing data
Eyewitness Testimony	0.81	6	8 Pieces
DNA	0.85	6	2 Pieces
Secondary Confession	0.86	6	9 Pieces
Expert Witness	0.83	6	9 pieces

All Alpha scores were greater than .8, which indicated that the internal consistency of the items within each construct (i.e., evidence type) was very good (Gliem & Gliem, 2003).

9.1.2.3. *An ANOVA for testing the strength measure across each of the four evidence types.*

A one-way within-subjects ANOVA was conducted to investigate if significant differences existed between the different evidence types across the measure of perceived evidence strength. The means for each evidence types differed significantly across the measure of perceived evidence strength [F (3, 231) = 137.25, p <.001, η_p^2=.64]. Bonferroni post hoc comparisons showed that DNA evidence was rated as significantly stronger than expert testimony, eyewitness testimony and secondary confessions (all p <.001). Expert testimony was rated as significantly stronger than eyewitness testimony (p =.01) and secondary confessions (p <.001). Finally, eyewitness testimony was rated as significantly stronger than secondary confessions (p <.001). In summary, in Study three (Chapter Five), the strong anchor was always DNA evidence and weak anchor was always a secondary confession.

10. Appendix B

Materials used in first Quasi-Experiment and Pilot

Details included in the nine vignettes, across the three verdict types handed down in the real life trials.

	Guilty	Not Guilty	Not proven
Familiar victim	2 familiar 1 not	1 familiar 2 not	2 familiar 1 not
Vulnerable victim	2 vulnerable 1 not	1 vulnerable 2 not	2 vulnerable 1 not
Crime details	1.Housebreak/ stabbing 2.Argument/multiple injuries 3. Body not found.	1.Head injury/strangled 2.Neck injury/affixation 3.self-defence/stabbing	1.Cut throat 2.Body not found 3.Multiple injuries/blow to head.
Victim age (years)	51, 16, 33	19, 44, 26	18, 43, 26
Victim gender	2 female 1 male	1 female 2 males	3 female
Accused age	20, 22, 39.	33, 49, 23.	33, 21, 33.
Accused gender	3 males	3 males	3 males
Weapon used	2 yes, 1 unknown.	2 yes, 1 no.	2 yes, 1 unknown.
N words in Vignettes	425, 518, & 414. Mean = 452.33.	441, 263, & 272. Mean = 325.33.	399, 440, 429. Mean = 422.67

Cue types and cue number in each of the vignettes vignette, across the three verdict types handed down in the real life trials**.**

	Guilty	Not Guilty	Not Proven
Number of cues	Vignette 1: prosecution 7. Defence 5.	Vignette 2: prosecution 7. Defence =7.	Vignette 7: prosecution 6. Defence 5.
	Vignette 3: prosecution 9. Defence 9.	Vignette 4: prosecution 5. Defence 6.	Vignette 8: prosecution 9. Defence 7.
	Vignette 6: prosecution 9 Defence 6	Vignette 5: prosecution 5. Defence 5.	Vignette 9: prosecution 7. Defence 6.
Severity rating of vignette (mean)	Vignette 1=4.69	Vignette 2=4.25	Vignette 7=4.13
	Vignette 3=4.13	Vignette 4=3.88	Vignette 8=3.38
	Vignette 6=3.56	Vignette 5=3.94	Vignette 9=1.94
Familiarity rating of vignette (mean)	Vignette 1=2.06	Vignette 2=2.56	Vignette 7=1.69
	Vignette 3=2.00	Vignette 4=1.69	Vignette 8=1.50
	Vignette 6=1.94	Vignette 5=1.94	Vignette 9=1.94
Realism rating (mean)	Vignette 1=3.81	Vignette 2=4.00	Vignette 7=3.56
	Vignette 3=3.50	Vignette 4=3.50	Vignette 8=3.75
	Vignette 6=3.44	Vignette 5=4.19	Vignette 9=4.19

The severity, familiarity and realism scores were gathered from the pilot. Each of the scores mentioned could be ranked from one to five, with one indicating a low score and five symbolising a high score.

Pilot

Vignette 1

Opening statement

On the 18 of March 2015, Ms Emma Edmonds was murdered in her house in Linlithgow, Midlothian. She had 61 separate injuries, which included 37 knife wounds in her head, back and chest. Some of her wounds (on her right hand) showed that she was trying to protect herself. Her Heart, pulmonary artery and both lungs were severely injured. She was 51 and was pronounced dead at 02:02 by paramedics. Additionally, Mr Stuart Edmonds (aged 86) was her husband and was in the house when the crime occurred. The suspect of the trial was David Miller (aged 20) also from Linlithgow.

Evidence:

Rate evidence from 1 to 5 in the table for strength:

1 = very weak, 2 =weak, 3 = moderate strength, 4 =strong, and 5 = very strong.

Additionally rate how complex you think the information is out of 5:

1 = very simple, 2 = simple, 3 = moderate complexity, 4 =complex, and 5 = very complex.

Number	Evidence	Complexity Of Evidence.	Strength Of Evidence.
1	DNA link: blood of Ms sanders found on cloths (jogging trousers and track suit).		
2	Previous convictions (stabbings).		
3	Eyewitness testimony by Mr Edmonds suggested man in 20s which does fit with Millers profile.		
4	Miller admitted going to Grove Street armed with two knives.		
5	There is proposed confession, which suggests that David confessed to Mr Arnold that he murdered Ms Edmonds.		

6	Lack of evidence that Mr Arnold or Masson were there, prosecutor says evil and evidence shows guilt.		
7	Mr Arnold said he was either alone or with Mr Masson.		
8	Miss Taylor said they heard Mr Miller's voice asking to get in a flat before the police came and that he had money.		
9	If didn't attend to Kill Edmonds why did he stab them three times?		
10	Claims of Mr Miller trying to get rid of blood stained cloths, and asking another male to get rid of evidence.		
11	Framed: said Mr Arnold was wearing his jogging trousers and track suit.		
12	Mr Miller admitted to stabbing Mr Edmonds but said miss sanders was stabbed by accomplice.		
13	Defence says not enough evidence and that Mr Miller was going to steal a car not kill anyone.		
14	Mr Masson, who Miller said may have murdered Ms Edmonds, knows where he was the night of the incident, but not the night before it or the night before that.		
15	Proposed confession of Mr Miller to Mr Arnold that he killed Ms Edmond and then stabbed Mr Edmonds but other evidence proposed opposite (from Mr Edmonds confession).		

16	Proposed confession by Mr Arnold and special witness Det Insp Jerry Grey were at opposites, as confession proposed Mr Miller couldn't steal car as he never had keys but Det Insp Jerry Grey had found blood stained keys in the car in the drive way.		

1. Overall how severe do you rate the crime in this trial after reading through the opening statement and the evidence? Please rate the overall severity of the crime out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the severity of the trial in the blank box provided.**

2. Overall how familiar is this trial to you after reading through the opening statement and the evidence? Please rate the familiarity of the crime out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the familiarity of the trial in the blank box provided.**

3. How realistic does this trial appear to you? Please rate how realistic the trial is out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the familiarity of the trial in the blank box provided.**

Vignette 2:

Opening statement

Miranda Grosel was murdered in April 24th 1980, she was 19 years old. She was last seen leaving a pub in North Berwick. Her body was found naked in Tyninghame woods, East Lothian, two weeks later by two hunters. The cause of death was believed to be strangulation, although head injuries were present. The accused is Victor Grythin, who is a taxi driver who lived close to both North Berwick and Tyninghame. He was originally a suspect of the murder in 1980 (aged 33 then), although police never had enough evidence to make any charges. The case was reopened in 2014 because of more modern means of forensic analyses. The accused is now 61.

Evidence:

Rate evidence from 1 to 5 in the table for strength:

1 = very weak, 2 = weak, 3 = moderate strength, 4 = strong, and 5 = very strong.

Additionally rate how complex you think the information is out of 5:

1 = very simple, 2 = simple, 3 = moderate complexity, 4 = complex, and 5 = very complex.

Number	Evidence	Complexity Of evidence	Strength Of Evidence.
1	Several DNA matches. Matches from a blue jumper which draped Miranda's body fitted Mr Grythin's DNA profile.		
2	One swab of the jumper, which was performed on the right hand side, suggests that the DNA belonging to anyone else but Mr Grythin are one in 320,000.		
3	A swab from the right arm suggests that the odds of the DNA not being his are 1 in 38.		
4	A Swab from the back of the jumper suggested that the chances of someone other than Mr Grythin touching the jumper are 1 in 105,000.		

5	Also, a root of hair found on a plastic sheet, which may have been wrapped round Miranda's body partially matched Mr Grythin's DNA profile.		
6	Overall the odds of someone else having contributed DNA to the combined evidence is 1:40,000,000.		
7	Dr Steven Brown, therefore, proposed that it is likely that the DNA discovered did belong to Victor Grythin and the DNA results found would be expected if the accused had touched the evidence.		
8	People witnessed Mr Grythin's taxi in the Tyninghame woods.		
9	Mr Grythin admitted being in the woods on two separate occasions the night of Miranda's disappearance at 10pm and at midnight.		
10	Miranda was on own leaving club and may have used a taxi to try to get home.		
11	No witnesses that saw the accused with the suspect.		
12	No motive by the suspect.		
13	Alibi from Mr Grythin. He said he was walking his dog in the Tyninghame woods at 10pm and went back to woods at 12 o'clock to steal from a car he saw there in the first occurrence.		
14	The DNA evidence could have been contaminated by the fact that the evidence from Ms Grosel and Mr Grythin was stored in the same box.		

15	Police have suggested that in the initial collection of evidence no safe guards (such as now commonly used sterilisation techniques) were used when trying to protect the evidence or crime scene.		
16	No "protective clothing" was used when the police removed the body.		
17	It has also been insinuated by a police officer that the pathologist did not wear gloves when removing the ring of Ms Grosel.		
18	No evidence, whether biological or testimonial, links Ms Grosel to Mr Grythin's taxi, which was preached by defence attorney Mr Stuart Doherty.		
19	No evidence that the plastic sheet found with a hair root was the sheet that was wrapped around Miranda claimed the defence.		
20	The DNA specialist, Dr Steven Brown, agreed with the defence, Mr Stuart Doherty, that there was limitations and conditions attached to his report of the findings.		

1. Overall how severe do you rate the crime in this trial after reading through the opening statement and the evidence? Please rate the overall severity of the crime out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the severity of the trial in the blank box provided.**

2. Overall how familiar is this trial to you after reading through the opening statement and the evidence? Please rate the familiarity of the crime out of 5. 1 = very low, 2 =

low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the familiarity of the trial in the blank box provided.**

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3. How realistic does this trial appear to you? Please rate how realistic the trial is out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the familiarity of the trial in the blank box provided.**

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Vignette 3:

Opening statement:

16 year old Alex McFarlane was found dead on the 14th of June 2014 not wearing a lot of clothing. He was found in a derelict army base in Shetland by Jake Sarro a coastguard. He was found nearly two weeks after his disappearance. Alex had been hit on the cranium and body with a bottle and knife. Also, he was stabbed 20 times; 18 of which were associated with stabbings and two which show evidence of "*complex cutting*". A 22 year old male is accused of this murder. The name of the accused is Joe Malcom. The accused and victim worked with each other on a fishing boat.

Evidence:

Rate evidence from 1 to 5 in the table for strength:

1 = very weak, 2 =weak, 3 = moderate strength, 4 =strong, and 5 = very strong.

Additionally rate how complex you think the information is out of 5:

1 = very simple, 2 = simple, 3 = moderate complexity, 4 =complex, and 5 = very complex.

Number	Evidence	Complexity Of Evidence.	Strength Of Evidence.
1	Forensic scientist Kirstie Peterson found DNA evidence which linked the accused to the murder.		
2	Spots of Joe Malcom's blood were found on the carpet.		
3	Joe Malcom's blood was also found on Alex McFarlane socks.		
4	Joe Malcom's DNA matched DNA found on Alex McFarlane's other sock.		
5	Joe Malcom's DNA matched DNA found on a door handle where Alex was found dead.		

6	Witness Dean Laird said that he shared a cell with Joe Maclom, and that the accused had bragged about taking the victim (Alex McFarlane) to an abandoned building and stabbed him.		
7	Witness Grant Morgan said that the accused (Joe Malcom) stole a meat cleaver, and spoke of wanting to stab someone. Joe also said that stabbing a pig would be similar to human flesh.		
8	The accused was the last person seen with the victim.		
9	A Derek Fletcher told police that the accused and the victim had been drinking together, and Joe Malcom and Alex McFarlane had a fight.		
10	Girlfriend, Barbara McDonald, told police that Joe Malcom said they left Alex in a ditch after the fight as he was "being and idiot".		
11	Ex-girlfriend (Tina Lithgow) of Joe Malcom text him asking for the truth in relation to what happened to Alex.		
12	Joe's girlfriend also said to police that Joe was acting suspicious.		
13	Claims that a fight first broke out between Alex and Joe as Joe accused Alex of stealing aftershave.		
14	Joe Malcom once attended hospital for an injured hand, and asked a medical worker (Hannah Mullen) if they thought he was disturbed.		

15	Joe admits to fighting with Alex, but says he was fine and went to stay at friend's house after the incident (Alex's girlfriend's sister Lindsey McDonald).		
16	Joe Malcom denies having anything to do with murder, and heard about Alex's death whilst he was on a fishing boat.		
17	Forensic scientist Kirstie Peterson found no evidence from Joe Malcom's home linking him to the case .		
18	Joe Malcom denies confessing to Dean Laird.		
19	Two witnesses (Derek Fletcher and Tina Lithgow) said that Joe Malcom had told them that he had thought with Alex McFarlane, but he had been fine and had then went to girlfriend's sisters after the incident.		
20	Tina also provided text messages to police showing that Callum Stevenson (Joe's friend) text saying that Joe had not killed Alex, and that Joe and Callum were together all night.		
21	Girlfriend, Barbara McDonald, agreed with defence lawyer David Ramsay that when she asked Joe Malcom why he had left Alex in a ditch, he replied "we left Alex on the road not a ditch".		
22	Grant Morgan admitted to the defence that Joe's statement about stabbing someone and his comment about pig flesh may have been a joke.		
23	Hannah Mullen (medical worker who treated Joe's hand) stated to defence that he was composed and well mannered.		

24	Mr Joe Malcom stated at court "There is a difference between being in a fight with someone and murdering someone".		
25	No murder weapon was ever found.		
26	The defence claim there is no logical reason why Joe Malcom would confess to a 16 year old boy (Dean Laird), and what Mr Laird has said has greatly exaggerated what Mr Malcom told him.		

1. Overall how severe do you rate the crime in this trial after reading through the opening statement and the evidence? Please rate the overall severity of the crime out of 5. <u>1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high.</u> **Please type/write how you rate the severity of the trial in the blank box provided.**

   ☐

2. Overall how familiar is this trial to you after reading through the opening statement and the evidence? Please rate the familiarity of the crime out of 5. <u>1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high.</u> **Please type/write how you rate the familiarity of the trial in the blank box provided.**

   ☐

3. How realistic does this trial appear to you? Please rate how realistic the trial is out of 5. <u>1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high.</u> **Please type/write how you rate the familiarity of the trial in the blank box provided.**

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Vignette 4:

Opening statement:

On August 24th at 11pm, Nicholas French (aged 44) was killed outside of Frasier Johnson's house in Tranent, East Lothian. Nicholas suffered severe knife wounds to the spleen, kidney and liver, which most likely were the cause of death. The incident was captured on CCTV. The CCTV showed that Nicholas French turned up to Mr Frasier's house. The accused is Frasier Johnson (aged 49), who owns a security firm in the county of East Lothian. Nicholas previously had worked for Mr Johnson, but after personal problems between the two Nicholas terminated his employment and started working for East Lothian council.

Evidence:

Rate evidence from 1 to 5 in the table for strength:

1 = very weak, 2 =weak, 3 = moderate strength, 4 =strong, and 5 = very strong.

Additionally rate how complex you think the information is out of 5:

1 = very simple, 2 = simple, 3 = moderate complexity, 4 =complex, and 5 = very complex.

Number	Evidence	complexity Of Evidence.	Strength Of Evidence.
1	Frasier was seen on CCTV, which he installed himself, stabbing Nicholas French.		
2	Frasier was seen on CCTV, which he installed himself, stabbing Nicholas French.		
3	Frasier's partner of 24 years left him for Nicholas. (motive).		
4	Nicholas threatened Frasier's son (Shaun) in an attempt to get Shaun to speak to his mum. (motive).		
5	Nicholas made a threatening gesture involving a knife about Frasier Johnson to Shaun Johnson. (Motive).		
6	Frasier had a knife ready when Nicholas arrived at his home.		

7	Frasier stabbed Nicholas several times.		
8	Nicholas turned up on own to Frasers house.		
9	Nicholas arrived at Frasier's home with a knife.		
10	Nicholas had a friend (Kyle Matheson) with him when he came to Frasier's home.		
11	Nicholas slashed the tyres of Frasier's car.		
12	Nicholas shouted "I'm going to murder all of you. I'm going to kill you all and I am going to take whatever money you have."		
13	Nicholas then slashed Frasier's face.		
14	Acted in self-defence.		

1. Overall how severe do you rate the crime in this trial after reading through the opening statement and the evidence? Please rate the overall severity of the crime out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the severity of the trial in the blank box provided.**

2. Overall how familiar is this trial to you after reading through the opening statement and the evidence? Please rate the familiarity of the crime out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the familiarity of the trial in the blank box provided.**

3. How realistic does this trial appear to you? Please rate how realistic the trial is out of 5. <u>1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high.</u> **Please type/write how you rate the familiarity of the trial in the blank box provided.**

Vignette 5:

Opening statement:

On December 15, 2014, Jamie Strachan (aged 26 and male) was on a night out with friends in Edinburgh. Jamie was drunk and refused entry from the bar his friends attended. He then went alone to the bar next door. He fell asleep and was asked to leave by the bouncers. The bouncers then physically removed Jamie. He was then pronounced dead outside the bar by paramedics. The accused is one of the bouncers. The bouncers name is Barry Barton (aged 23). The accused is a part time bouncer who also studies mathematics at a local university (i.e. Herriot Watt).

Evidence:

Rate evidence from 1 to 5 in the table for strength:

1 = very weak, 2 =weak, 3 = moderate strength, 4 =strong, and 5 = very strong.

Additionally rate how complex you think the information is out of 5:

1 = very simple, 2 = simple, 3 = moderate complexity, 4 =complex, and 5 = very complex.

Number	Evidence	Complexity Of Evidence.	Strength Of Evidence.
1	Prosecution lawyer (Fredrick Peterson) said the bouncer acted with malice.		
2	Barry grabbed Mr Strachan by the neck and forced him to the ground in a choke hold.		
3	Witness Ross Benn said that Jamie's body went limp after the choke hold.		
4	CCTV footage shows Barry Barton, and fellow bouncers Nichol Watters and Craig Blair, assaulting Mr Strachan.		
5	Several of Jamie's friends testify that Jamie was lying on pavement motionless whilst being held by the bouncers when they saw him.		

6	Several witnesses from the surrounding area said that they could see Jamie's face turning blue and grey and blood was leaking from his mouth.		
7	Allegations by prosecution suggest that Barry struck Jamie on the head and held his neck, whilst his colleagues restrained him.		
8	The assault by Barry may have restricted Jamie's airways and caused him to die asphyxiating him.		
9	This cause of death was supported by expert forensic pathologist professor Douglas Grant.		
10	Pathologist also stated that Jamie had haemorrhages under his eyelids and on his eyes. This is associated with the brain being starved of oxygen.		
11	Cocaine was also found in Jamie's system by pathologist Professor Douglas Grant. This led another pathologist Dr Margaret Tennant stating "you cannot rule out that Jamie might have died because of an irregular heartbeat caused by his intake of cocaine".		
12	Barry Barton denies murdering Jamie Strachan.		
13	Barry and his defence councillor (Liam Mangham) suggest that Jamie tried to attack Barry's college Nichol Watters and the accused was acting in self-defence.		
14	The defence highlight that Barry was just doing his job.		

15	Barry never meant to kill Jamie.		
16	Barry denies intentionally murdering the victim.		

1. Overall how severe do you rate the crime in this trial after reading through the opening statement and the evidence? Please rate the overall severity of the crime out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the severity of the trial in the blank box provided.**

    [ ]

2. Overall how familiar is this trial to you after reading through the opening statement and the evidence? Please rate the familiarity of the crime out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the familiarity of the trial in the blank box provided.**

    [ ]

3. How realistic does this trial appear to you? Please rate how realistic the trial is out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the familiarity of the trial in the blank box provided.**

    [ ]

Vignette 6:

Opening statement:

Jessica Rae, aged 33, disappeared on the 31st of March 2012 from her home in Edinburgh. She was last seen dropping her two children off at school and was noticed missing by her friend Lauren Wilson. This therefore suggests she went missing between the times of 9:30 and 11:05 when Lauren arrived at Jessica's home. Jessica's body was never recovered and no trace of her was ever found. She has therefore been presumed dead by the police. Further, we do not know how Jessica died, or where she may be buried. The accused is her Husband John Rae, aged 39. The relationship had been in turmoil lately and a divorce was likely.

Evidence:

Rate evidence from 1 to 5 in the table for strength:

1 = very weak, 2 =weak, 3 = moderate strength, 4 =strong, and 5 = very strong.

Additionally rate how complex you think the information is out of 5:

1 = very simple, 2 = simple, 3 = moderate complexity, 4 =complex, and 5 = very complex.

Number	Evidence	Complexity Of Evidence.	Strength Of Evidence.
1	Jessica was leaving John, and she met with lawyer to discuss a possible pay-off. The divorce may have cost John around £86,000.		
2	John's friend William Richardson has stated that John told him that he had hired a hitman and paid him £15,000 to kill Jessica Rae. Mr Richardson also suggested that John had told him that Jessica's body was burned, and that her teeth and remains were ground up.		
3	Jessica disappeared on the day she was supposed to see a solicitor about a divorce.		
4	The prosecution insinuate that the killer must have known that Jessica would be home alone between the times of 9:30 and 11.05, which suggests that this information may have been leaked to the killer by John Rae.		

5	Witnesses suggest the couple had split the month before.		
6	Lauren Wilson has said that when she arrived at the home at 11:05 electrical devices such as the hoover were still plugged in, the washing machine was still on, and Jessica's glasses and diabetes tablets were still at home. This highlights she may not have left on her own accord.		
7	John Rae did not inquire about Jessica's disappearance.		
8	Mother of Jessica (Lucy McPherson) asked John if he had "did anything to Jessica".		
9	John Rae seemed calm and composed through whole disappearance case .		
10	Several neighbours have told police that Jessica was an amazing mother and would never have left her children.		
11	Jessica solicitors have stated how she told them that John was recording her calls, and stalking her.		
12	Jessica also told the solicitors that John wanted the car.		
13	John had also lied to Jessica and told her that the house had a mortgage when it did not.		

14	John reportedly told Jessica that "You aren't going to live with anyone else if you can't live with me".		
15	Witnesses at Johns work have said John was uneasy at the reported time of Jessica's disappearance.		
16	John has made jokes in relation to Jessica's disappearance, such as wearing a wig and saying it was the one Jessica used to disappear.		
17	John Said to Jessica's father (Peter McPherson) that his children would forget their mother before she was pronounced dead.		
18	Witness said that John was paranoid that Jessica already had a lover and that "nobody could have her, if he couldn't".		
19	Jessica's rings reappeared in the bathroom.		
20	Alibi doesn't stop John having hired a hitman.		
21	Police officers say they saw ring on day of Jessica's disappearance.		
22	No evidence of a break in to house.		
23	Defence Lawyer Donald Reacher said that the prosecution's evidence was unreliable and mostly based on assumption.		
24	John has always protested that he is not guilty.		

25	John had an Alibi for when Jessica went missing. He was working with a colleague, selling goods, and had made a phone call to another female.		
26	John insisted that Jessica run off and took a "stash" of money with her.		
27	Defence suggest that William Richardson may have been a better fit for the murder conviction.		
28	No crime scene was ever produced.		
29	No murder weapon found.		
30	No forensic or biological evidence linking John to the murder has been found.		
31	No body ever found.		

1. Overall how severe do you rate the crime in this trial after reading through the opening statement and the evidence? Please rate the overall severity of the crime out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the severity of the trial in the blank box provided.**

2. Overall how familiar is this trial to you after reading through the opening statement and the evidence? Please rate the familiarity of the crime out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the familiarity of the trial in the blank box provided.**

3. How realistic does this trial appear to you? Please rate how realistic the trial is out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the familiarity of the trial in the blank box provided.**

Vignette 7:

Opening statement

Ms Rachel Foster (aged 18) was supposed to return to her parents, in Blackburn, from her new fiancé's house in Muir-of-Ord (near inverness). She left her fiancés flat on Sunday 23rd of February, 2014, to go to the train station. She never arrived at her parents. Her Fiancé, called Jeremy Damon, became worried after phoning her parents and realising she had not arrived home. Her body was found the next again day with her throat slit in a wasteland near Inverness. The suspect of the murder, Robert Pratt (aged 33), is an ex-policeman, and marine; and had only recently met Rachel as she had become Roberts's brother in laws (Jeremy Damon) new fiancé.

Evidence:

Rate evidence from 1 to 5 in the table for strength:

1 = very weak, 2 =weak, 3 = moderate strength, 4 =strong, and 5 = very strong.

Additionally rate how complex you think the information is out of 5:

1 = very simple, 2 = simple, 3 = moderate complexity, 4 =complex, and 5 = very complex.

Number	Evidence	Complexity of Evidence.	Strength Of Evidence.
1	Robert when approached to the police confessed, he said "I never thought you would catch me. I killed Rachel, but it's really getting to me now" according to Superintendent James Davidson.		
2	A Mr Eric Banner said he saw someone that matched both Ms Foster and Mr Pratt's description at the Pratt residence arguing intensely.		
3	Special witness former commando Mark Balboa said "the injuries to the victim would need military expertise, which Robert of course has".		
4	Robert shared a cell with a prisoner when he was detained called Victor Reynolds, and had apparently confessed to him that he had "slit" Rachel's neck and murdered her.		

5	Allegations that Robert threatened a couple in a local pub, and said if the police were aware they would end up the same way as "their buddy".		
6	Alex asked his brother in-law, on the day the body was found, if it hurt when he had sex with her (lorna).		
7	Jeremy Damon went to Roberts home the day after Rachel's disappearance and found Robert burning "stuff", which the suspect had said were "dead ferrets".		
8	Mr Pratt has said that he was innocent.		
9	Mr Pratt stated that his proposed confession was a fabrication.		
10	The defence have strongly suggest that Eric Banner is lying.		
11	Eric Banners, who witnessed the accused and victim arguing, bother (Charlie Banner) said" Eric's testimony cannot be correct as I knew where Eric was nowhere near the Pratts residence when Rachel went missing. Eric was outside of Scarlet Leach's flat. Both me, and my brother (Eric) were in a love triangle at the time with Scarlet, and I was therefore keeping an eye on my love rival".		
12	Rachel was not sexually assaulted, so why would Robert ask his brother in-law (Jeremy) if sex hurt with Rachel if he had not had sex with her ?		

13	No biological testimony found at the crime scene.		
14	No weapon was found which linked Robert to the murder.		

1. Overall how severe do you rate the crime in this trial after reading through the opening statement and the evidence? Please rate the overall severity of the crime out of 5. <u>1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high.</u> **Please type/write how you rate the severity of the trial in the blank box provided.**

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2. Overall how familiar is this trial to you after reading through the opening statement and the evidence? Please rate the familiarity of the crime out of 5. <u>1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high.</u> **Please type/write how you rate the familiarity of the trial in the blank box provided.**

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3. How Realistic does this trial appear to you? Please rate how realistic the trial is out of 5. <u>1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high.</u> **Please type/write how you rate the familiarity of the trial in the blank box provided.**

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Vignette 8:

Opening statement:

On January 12th 2012 Mother of two, Jean Carr (aged 43), went missing. She lived in Livingston, near Uphall, with her son Daniel (aged 21) and her daughter Jade (aged 10). Jean has never returned, and has been missing ever since she disappeared. Likewise, her body has never been found, and no evidence has been provided showing where she has went. However, the police have since presumed that she is dead, and they started a murder enquiry shortly after her disappearance. The accused is Jean's Son, Daniel Carr. The accused and the victim had an argument shortly before Jean's disappearance.

Evidence:

Rate evidence from 1 to 5 in the table for strength:

1 = very weak, 2 =weak, 3 = moderate strength, 4 =strong, and 5 = very strong.

Additionally rate how complex you think the information is out of 5:

1 = very simple, 2 = simple, 3 = moderate complexity, 4 =complex, and 5 = very complex.

Number	Evidence	Complexity Of Evidence.	Strength Of Evidence.
1	Daniel had an argument with Jean before she disappeared about Daniel's future court case.		
2	The argument happened after Daniel had come home from the pub intoxicated.		
3	Daniel and Jean may also have had an argument over the fact that Daniel was dating a girl 25 years older than himself called Debbie Thomson.		
4	Daniel reportedly said during argument "… would you please just fuck of and stop breathing".		

5	Daniel also had previously spent three years in jail for killing best friend, Philip Bowie, and cousin, Elton Carr, whilst driving dangerously. This happened a month before Jean disappeared.		
6	Police say that they strongly believe that Jean is no longer alive.		
7	The prosecution suggest that Daniel is the only possible culprit.		
8	Jeans general practitioner, Dr Sean Queen, reported that Jean was a nice women, who loved her family. Other witnesses have stated that Jean would never have left her daughter Jade.		
9	Blood that matched the DNA of Jean Carr was found in the boot of Daniel Carr's girlfriends (Debbie Thomson) car, which Daniel had been loaned. The blood was on the wall and carpet of the car boot.		
10	Former forensic scientist Dr Kimberley Welsh stated "the chance of the blood belonging to someone who is unrelated is over 1 in a billion".		
11	None of Jean's family matched the blood sample.		

12	There may also have been signs that someone had tried to get rid of the blood stains in the car.		
13	Daniel's Jacket, shoes and jeans were also found with blood on them.		
14	A car that matched Daniels girlfriend's car, which he had been loaned, was seen on CCTV - by a forensic video analyst called Allister Inglis – leaving Livingston after Jean disappeared.		
15	Daniel had told a conflicting story to police as he told them he was in bed.		
16	Another Forensic scientist James McIntyre said the blood in Daniels girlfriend's car is similar to what he has seen in the past when bodies have been placed in puts for a long time.		
17	Blood was also found on exterior of car by specialist analysers in England 16 months after Jeans Disappearance.		
18	Daniel did not cooperate with officers when the police were trying to solve why his mum had went missing.		
19	Pc Simon Taylor (aged 32) stated that "all the family seemed distressed apart from Daniel".		

20	Daniel told police that on the 13th of January 2012 he was in Edinburgh "checking his shifts", but police have found he was near Linlithgow from tracing his mobile phone.		
21	The prosecution Lawyer Mr Tony Prescott cited a police officer saying "individuals will return in the daylight to visit the bodies they have buried."		
22	The accused denies the blood stains are Jean Carr's.		
23	There were 64 blood stains that were present in the Car and only three of them matched Jean's DNA profile.		
24	Judge said that jurors should not take into account previous trials as they are not important in the present trial.		
25	Ms Carr had previously had a pregnancy terminated, troubles with boyfriends, depression, anorexia, and some financial issues.		
26	Defence lawyer Mr John Blair has stated that jean had not taken her anti-depressant medication in the days before she disappeared.		
27	Jeans sister Amy, told the court that Jean could be aggressive and could sometimes act out of character.		
28	No body was ever found.		

29	No crime scene was ever found.		
30	The argument between Daniel and Jean ended with Jean leaving the house, which Daniel said was normal. However, Daniel says this was the last time he saw his mother.		
31	Daniel denies murder.		
32	There is no evidence that Jean was even murdered suggests the defence council.		

1. Overall how severe do you rate the crime in this trial after reading through the opening statement and the evidence? Please rate the overall severity of the crime out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the severity of the trial in the blank box provided.**

   ☐

2. Overall how familiar is this trial to you after reading through the opening statement and the evidence? Please rate the familiarity of the crime out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the familiarity of the trial in the blank box provided.**

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3. How Realistic does this trial appear to you ? Please rate how realistic the trial is out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the familiarity of the trial in the blank box provided.**

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Vignette 9

Opening statement:

On August 26th 2014 prostitute Ellen McCrae (aged 26), went missing in Edinburgh near Leith docks. She lived in Edinburgh, and turned to prostitution to pay for her drug habit after her boyfriend David Herschel introduced her to drugs. Ellen McCrae was found dead, battered and half naked whilst being covered by a curtain near a bus stop in Portobello. Cause of death is thought to have been strangulation by an S & M collar. 118 injuries were found on her body, which included fractures to her cranium and jaw, and shattered cheekbones. Teeth were missing, which may have been caused by blows to the head from a hammer. The accused is Bruce Stark (aged 43).

Evidence:

Rate evidence from 1 to 5 in the table for strength:

1 = very weak, 2 =weak, 3 = moderate strength, 4 =strong, and 5 = very strong.

Additionally rate how complex you think the information is out of 5:

1 = very simple, 2 = simple, 3 = moderate complexity, 4 =complex, and 5 = very complex.

Number	Evidence	Complexity Of Evidence.	Strength Of Evidence.
1	Bruce admits that had met with Ellen the night before she had died.		
2	Mr Stark's Semen was found on Ms McCrae's underwear.		
3	Mr Stark said that he had had sex with Ms McCrae for 4 months prior to her death.		

4	Several prostitutes said that Mr Stark was responsible for Ms Ellen's death, as he was known by local prostitutes for enjoying S & M and his "violent sexual tendencies".		
5	Stark was known as the "beast" by many women and was a notorious customer.		
6	Several prostitutes suggested that Stark had hospitalised them in the past.		
7	One prostitute also said "Bruce would also have sex with us and refuse to pay".		
8	Mr Starks address was given as Saughton Prison, Edinburgh, by the court.		
9	Ellen's boyfriend (David Herschel) said that Mr stark must have been with his girlfriend on the day of her death, as "Ellen changed her pants twice a day, and would not have Bruce's sperm on her pants if she had only slept with him the night before".		
10	A white van was seen near Leith docks on the day of Ms McCrae's disappearance, which fitted the description of Mr Starks van.		
11	It was suggested by the prosecution lawyer, Victor Murdoch that more working calls could have been witnesses but did not come forward because of their "own secrets".		

12	A curtain similar to the one Ellen was found in had been seen in Mr Starks van previously.		
13	Mr stark had been acting strangely at his home, which was not far from murder scene, the day of Ellen's murder.		
12	Mr stark said that the statement he gave police about being in Leith docks when Ellen disappeared was wrong, and that the police officer had made an error when taking Mr Starks statement.		
13	Mr stark, and Defence Lawyer Jean Banner, lodged a special defence of Alibi (said he was working when Ellen went missing).		
14	Mr Stark said he was friends with Ms McCrae, and that she would tell him her financial troubles and dilemmas relating to her boyfriend (David Herschel).		
15	Stark said "My DNA would be found on Ellen's underwear as I had paid her for sex the day previous".		
16	Defence attorney told that "it is impossible that Mr Starks van was seen in the area of Ellen's disappearance; as he had not bought that van until January 2015".		
17	Defence attorney, Jean Banner, suggested 14 named men, and 3 unnamed men that may have been more likely to have killed Ellen.		
18	Some of the prostitutes were not sure whether Bruce Stark was Ellen McCrae's murderer.		

19	Also, police may have got wrong Stark. Since Ellen's death a Howard Stark who lived in Edinburgh has been convicted of murder, and was considered by the police as "evil".		
20	The defence proposed that Howard may have been the person who the prostitutes called "the beast".		
21	The court also heard how David Herschel (Ellen's boyfriend) had previous instances of hitting Ellen.		
22	The defence's closing statement was "Yes, the DNA evidence from the semen shows that Mr Stark was intimate with Ms McCrae. However, it does not show he murdered Ellen, or that he was violent in any way".		

1. Overall how severe do you rate the crime in this trial after reading through the opening statement and the evidence? Please rate the overall severity of the crime out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the severity of the trial in the blank box provided.**

2. Overall how familiar is this trial to you after reading through the opening statement and the evidence? Please rate the familiarity of the crime out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the familiarity of the trial in the blank box provided.**

3. How realistic does this trial appear to you ? Please rate how realistic the trial is out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 = very high. **Please type/write how you rate the familiarity of the trial in the blank box provided.**

4. Finally, how similar would you rate these trials in relation to one another? Please rate the similarity of the crimes out of 5. 1 = very low, 2 = low, 3 = moderate, 4 = high, and 5 =

very high. **Please type/write how you rate the similarity of the trial in the blank box provided.**

[ ]

Vignettes for First Quasi-Experiment

Task instructions

In this experiment, you should think like a real life juror, and use the evidence presented to reach a verdict. It is of high importance you take this seriously, as the cases are based on real life trials, and the evidence presented today will be used for future appeals.

In this experiment, you will firstly be shown an opening statement, which is there to provide context. Then, you will be presented with information in a sequential fashion (i.e., one after the other). If the information suggests to you the suspect is guilty press G (for Guilty), if the evidence presented suggests innocence press N (for Not Guilty), and if the information shows neither guilt or innocence then press P (for Not Proven). You will also be asked to rate the likelihood of guilt (from 1 to 100) after seeing each piece of evidence. These continuous judgments should be made by combining the evidence you have seen so far. Once all the evidence has been presented you will be asked for a final verdict. Here you will either press G (for Guilty), N (for Not Guilty), or P (for Not Proven).

In each of the vignettes, participants were given the following instruction once they had given a final verdict: "Please type the number of the corresponding piece of evidence which was the last piece of evidence you needed to make a decision/verdict." In each of the vignettes, every piece of evidence had a corresponding number attached to it.

Vignette 1

Opening statement

On the 18 of March 2015, Ms Emma Edmonds was murdered in her house in Linlithgow, West lothian. She had 61 separate injuries, which included 37 knife wounds in her head, back and chest. Some of her wounds (on her right hand) showed that she may have been trying to protect herself. Her heart, pulmonary artery and both lungs were severely injured. She was 51, and was pronounced dead at 02:02 by paramedics. Additionally, Mr Stuart Edmonds (aged 86) was her husband, and was in the house when the crime occurred. The suspect of the trial was David Miller (aged 20) also from Linlithgow. He claims that Steven Arnold, and Ryan Masson were present when Mr Miller tried to rob the Edmonds residence.

Number	Evidence
1	Mr Miller has previous stabbing convictions.
2	Miller admitted going to Ms Edmonds address armed with two knives.
3	There is a proposed confession, which suggests that David Miller confessed to Mr Arnold that he murdered Ms Edmonds.
4	Mr Arnold said that Mr Miller was either alone, or with Mr Masson.
5	Miss Taylor, an eyewitness, said she heard Mr Miller's voice asking to get in a flat before the police came, and that he had mentioned money.
6	Prosecution Lawyer asks question to the jury "If Mr Miller didn't intend to Kill Miss Edmonds why did he stab her 37 times?"
7	Claims of Mr Miller trying to get rid of blood stained cloths, and asking another male to get rid of evidence. This was told to the court by Mr Arnold.
8	Mr Miller claimed he was framed, saying "Mr Arnold was wearing my jogging trousers and track suit that night, that's why blood was found on them".

9	Mr Miller said Miss Edmonds was stabbed by one of his accomplices, i.e. Mr Arnold or Mr Masson.
10	Defence says there is not enough evidence to convict, and that Mr Miller was going to steal a car, and did not kill anyone.
11	Mr Masson, who Miller said may have murdered Ms Edmonds, knows where he was the night of the incident, but not the night before it, or the night before that.
12	Proposed confession by Mr Miller to Mr Arnold may not be credible. This is because the testimony that Mr Arnold gave to the court was contradictory to the testimony given by special witness, Det Insp Jerry Grey. This is because what Mr Arnold told the court was that Mr Miller couldn't steal Miss Edmonds car as he never had the car keys. However, Det Insp Jerry Grey found blood stained car keys in Ms Edmonds car.

Vignette 2:

Opening statement

Miranda Grosel was murdered in April 24th 1980, she was 19 years old. She was last seen leaving a pub in North Berwick. Her body was found naked in Tyninghame woods two weeks later by two hunters. The cause of death was believed to be strangulation, although head injuries were present. It has been suggested that her body may have been moved, using a plastic sheet, to her final resting place. The accused is Victor Grythin, who is a taxi driver who lived close to both North Berwick. He was originally a suspect of the murder in 1980 (aged 33 then), although police never had enough evidence to make any charges. The case was reopened in 2014 because of more modern means of forensic analyses. The accused is now 68.

Number	Evidence
1	Several DNA matches. Matches from a blue jumper which draped Miranda's body fitted Mr Grythin's DNA profile.
2	One swab of the jumper, which was performed on the right hand side, suggests that the chances of the DNA belonging to anyone else, but Mr Grythin, are 1 in 320,000.
3	A swab from the right arm suggests that the odds of the DNA not being his are 1 in 38.
4	A Swab from the back of the jumper suggested that the chances of someone other than Mr Grythin touching the jumper are 1 in 105,000.
5	Overall the odds of someone else having contributed DNA to the combined evidence is 1:40,000,000.
6	Mr Grythin admitted being in the woods on two separate occasions the night of Miranda's disappearance at 10pm and at midnight.
7	Miranda was on own leaving club and may have used a taxi to try to get home.
8	There was no motive for the suspect to commit murder.

9	The DNA evidence could have been contaminated by the fact that the evidence from Ms Grosel and Mr Grythin were stored in the same box.
10	Police have suggested that in the initial collection of evidence no safe guards (such as now commonly used sterilisation techniques) were used when trying to protect the evidence, or the crime scene.
11	No "protective clothing" was used when the police removed the body.
12	It has also been insinuated by a police officer that the pathologist did not wear gloves when removing the ring of Ms Grosel.
13	No evidence that the plastic sheet found with a hair root, from Mr Grythin, was the same sheet that was used to cover, and carry, Miranda to the place where she was found by the two hunters.
14	The DNA specialist, Dr Steven Brown, agreed with the defence attorney, Mr Stuart Doherty, that there was limitations, and conditions, attached to his report of the findings.

Vignette 3:

Opening statement:

16 year old Alex McFarlane was found dead on the 14th of June 2014 wearing very little clothing. He was found in a derelict army base in Shetland by Jake Sarro, who is a coastguard. He was found nearly two weeks after his disappearance. Alex had been hit on the cranium, and body with a bottle and knife. Also, he was stabbed 20 times; 18 of which were associated with stabbings, and two which show evidence of *"complex cutting"*. A 22 year old male is accused of this murder. The name of the accused is Joe Malcom. The accused and the victim worked with each other on a fishing boat.

Number	Evidence
1	Spots of Joe Malcom's blood were found on the carpet were Alex was found.
2	Joe Malcom's blood was also found on Alex McFarlane sock.
3	Joe Malcom's DNA matched DNA found on Alex McFarlane's other sock.
4	Witness Dean Laird said that he shared a cell with Joe Malcom, and that the accused had bragged about taking the victim (Alex McFarlane) to an abandoned building and stabbing him.
5	Witness Grant Morgan said that the accused (Joe Malcom) stole a meat cleaver, and spoke of wanting to stab someone. Joe also said that stabbing a pig would be similar to stabbing human flesh.
6	The accused was the last person seen with the victim.

7	A Derek Fletcher, a witness, told police that the accused and the victim had been drinking together, and Joe Malcom and Alex McFarlane had a fight.
8	Alex's girlfriend, Barbara McDonald, told police that Joe Malcom said he left Alex in a ditch after the fight as he was "being an idiot".
9	Joe Malcom once attended hospital for an injured hand, and asked a medical worker (Hannah Mullen) if she thought he was disturbed.
10	Joe admits to fighting with Alex. But, says Alex was fine and that Alex went to stay at a friend's house after the incident (Alex's girlfriend's sister Lindsey McDonald).
11	Joe Malcom denies having anything to do with the murder, and says he heard about Alex's death whilst he was on a fishing boat.
12	Joe Malcom denies confessing to Dean Laird.
13	Two witnesses (Derek Fletcher and Tina Lithgow) said that Joe Malcom had told them that he had fought with Alex McFarlane, but that Alex had been fine and had went to his girlfriend's sisters after the incident.
14	Tina also provided text messages to police showing that Callum Stevenson (Joe's friend) text saying that Joe had not killed Alex, and that Joe and Callum were together all night.
15	Grant Morgan admitted to the defence that Joe's statement about stabbing someone, and his comment about pig flesh, may have been a joke.
16	Hannah Mullen (medical worker who treated Joe's hand) stated to defence that he was composed, and well mannered.

Number	Evidence
17	Mr Joe Malcom stated at court "There is a difference between being in a fight with someone and murdering someone".
18	The defence claim there is no logical reason why Joe Malcom would confess to a 16 year old boy (Dean Laird), and what Mr Laird has told the court has greatly exaggerated what Mr Malcom told him.

Vignette 4:

Opening statement:

On August 24th at 11pm Nicholas French (aged 44), from Ormiston, was killed outside of Frasier Johnson's house in Tranent, East Lothian. Nicholas suffered severe knife wounds to his spleen, kidney and liver, which most likely were the cause of death. The incident, with the accused, was captured on CCTV from the suspect's house. The accused is Frasier Johnson (aged 49) from Tranent, who owns a security firm in the county of East Lothian. Nicholas previously had worked for Mr Johnson and they had been friends. However, after personal problems between the two Nicholas terminated his employment, and started working for East Lothian council.

Number	Evidence
1	Frasier's partner of 24 years left him for Nicholas.
2	Nicholas threatened Frasier's son (Shaun) in an attempt to get Shaun to speak to his mum.
3	Nicholas made a threatening gesture involving a knife about Frasier Johnson to Shaun Johnson (Frasier's son).
4	Frasier had a knife ready when Nicholas arrived at his home, which was shown on the CCTV.
5	Frasier stabbed Nicholas several times, which was shown on the CCTV.

6	The CCTV highlighted that Nicholas turned up on his own free will to Frasier's house.
7	Nicholas arrived at Frasier's home with a knife, which was shown on the CCTV.
8	Nicholas slashed the tyres of Frasier's car, which was highlighted by the CCTV.
9	Nicholas shouted "I'm going to murder all of you. I'm going to kill you all, and I am going to take whatever money you have." This was reported by Mr Frasier.
10	Nicholas then slashed Frasier's face, which was shown on CCTV.
11	Frasier suggests that he acted in self-defence.

Vignette 5:

Opening statement:

On December 15, 2014, Jamie Strachan (aged 26 and male) was on a night out with friends in Edinburgh. Jamie was drunk and had been refused entry from the bar his friends attended. He then went alone to the bar next door. He fell asleep, and was asked to leave by the bouncers. The bouncers then physically removed Jamie from the bar they worked at, which is called the Orange Rose. Jamie was then pronounced dead outside the bar by paramedics. The accused is one of the bouncers. The doorman's name is Barry Barton (aged 23). The accused is a part time bouncer who also studies mathematics at a local university (i.e. Heriot Watt).

Number	Evidence
1	Witnesses have said that Barry grabbed Mr Strachan by the neck, and forced him to the ground in a choke hold.
2	Witness Ross Benn said that Jamie's body went limp after the choke hold.
3	Several witnesses from the surrounding area said that they could see Jamie's face turning blue and grey, and that blood was leaking from his mouth.
4	Allegations by prosecution suggest that Barry struck Jamie on the head and held his neck, whilst his colleagues restrained him.
5	The assault by Barry may have restricted Jamie's airways and caused him to die through asphyxiation (brain being starved of oxygen).
6	Barry Barton denies murdering Jamie Strachan.
7	Barry, and his defence councillor (Liam Mangham), suggest that Jamie tried to attack Barry's colleague, Nichol Watters, and the accused was acting in self-defence.

8	The defence highlight that Barry was just doing his job.
9	Barry never meant to kill Jamie, and was just restraining the victim.
10	Barry denies intentionally murdering the victim.

Vignette 6:

Opening statement:

Jessica Rae, aged 33, disappeared on the 31st of March 2012 from her home in Edinburgh. She was last seen dropping her two children off at school, and was noticed missing by her friend Lauren Wilson. This therefore suggests she went missing between the times of 9:30 and 11:05 when Lauren arrived at Jessica's home. Jessica's body was never recovered, and no trace of her was ever found. She has therefore been presumed dead by the police. Further, we do not know how Jessica died, or where she may be buried. The accused is her Husband John Rae, aged 39. The relationship had been in turmoil lately, and a divorce was likely.

Number	Evidence
1	Jessica was leaving John, and she had met with a lawyer to discuss a possible pay-off. The divorce may have cost John around £86,000.
2	John's friend William Richardson has stated that John told him that he had hired a hitman, and paid him £15,000 to kill Jessica Rae. Mr Richardson also suggested that John had told him that Jessica's body was burned, and that her teeth and remains were ground up.
3	The prosecution insinuate that the killer must have known that Jessica would be home alone between the times of 9:30 and 11.05, which suggests that this information may have been leaked to the killer by John Rae.
4	John Rae seemed calm and composed through the entire disappearance case according to several witnesses.
5	Several neighbours have told police that Jessica was an amazing mother, and would never have left her children.
6	John reportedly told Jessica that "You aren't going to live with anyone else, if you can't live with me". This was told to the court by one of Jessica's friends (Diana Potts).
7	Witness, Luke Parker, said that "John was paranoid that Jessica already had a lover, and had claimed that nobody could have her if he couldn't".

8	John's alibi (of working while Jessica disappeared) does not stop him from hiring a hitman.
9	No evidence of Jessica's home being broken into, which proposes murderer had access.
10	John has always protested that he is not guilty.
11	John had an Alibi for when Jessica went missing. He was working with a colleague, selling goods, and had made a phone call to another female.
12	Defence suggest that William Richardson may have been a better fit for the murder conviction.
13	No crime scene was ever produced.
14	No murder weapon was ever found.
15	No forensic, or biological evidence, linking John to the murder has ever been found.

Vignette 7:

Opening statement

Ms Rachel Foster (aged 18) was supposed to return to her parents, in Blackburn, from her new fiancé's house in Muir-of-Ord (near inverness) on Sunday 23rd of February, 2014. She left her fiancés flat, on the same date, to go to the train station. She never arrived at her parents, however. Her Fiancé, called Jeremy Damon, became worried after phoning her parents, and realising she had not arrived home. He then contacted the police. Her body was found the next again day with her throat slit in a wasteland near Inverness. The suspect of the murder, Robert Pratt (aged 33), is an ex-policeman, and marine; and had only just met Rachel as she had recently became Roberts brother in laws (i.e. Jeremy Damon) new fiancé.

Number	Evidence
1	Robert when approached by the police confessed. Robert said "I never thought you would catch me. I killed Rachel, but it's really getting to me now" according to Superintendent James Davidson.
2	A Mr Eric Banner said he saw someone that matched both Ms Foster and Mr Pratt's description at the Pratt residence arguing intensely.
3	Special witness, former commando Mark Balboa, said "the injuries to the victim would need military expertise to carry out, which Robert has".
4	Robert shared a cell with a prisoner when he was detained called Victor Reynolds, and had apparently confessed to him that he had "slit" Rachel's neck and murdered her.
5	Allegations that Robert threatened a couple in a local pub (James Howlett and Jean Grey) and said "if the police are made aware about this, you will end up the same way as your buddy, Rachel".
6	Jeremy Damon went to Roberts home the day after Rachel's disappearance and found Robert burning "stuff", which the suspect had said were "dead ferrets".

7	Mr Pratt stated that his proposed confession was a fabrication by the police.
8	Charlie Banner (Eric Banners brother), said" Eric's testimony cannot be correct, as I know that Eric was nowhere near the Pratts residence when Rachel went missing. Eric was outside of Scarlet Leach's flat. Both me, and my brother (i.e. Eric) were in a love triangle at the time with Scarlet, and I was therefore keeping an eye on my love rival".
9	Robert denies confessing to Victor Reynolds, and claims "Victor is simply a liar!"
10	No biological evidence found at the crime scene connecting Robert to murder.
11	No weapon was found which linked Robert to the murder.

Vignette 8:

Opening statement:

On January 12th 2012 Mother of two, Jean Carr (aged 43), went missing. She lived in a council estate in Livingston, near Uphall, with her son Daniel (aged 21) and her daughter Jade (aged 10). Jean has never returned, and has been missing ever since she disappeared. Likewise, her body has never been found, and no evidence has been provided showing where she has went. However, the police have since presumed that she is dead. Further, the police started a murder enquiry shortly after her disappearance. The accused is Jean's Son, Daniel Carr. The accused and the victim had an argument shortly before Jean's disappearance.

Number	Evidence
1	Daniel had an argument with Jean before she disappeared, which was centred on Daniels future court trial.
2	Daniel reportedly said during argument "… would you please just fuck off and stop breathing". This statement was reported by neighbours.
3	Blood that matched the DNA of Jean Carr was found in the boot of Daniel Carr's girlfriends (Debbie Thomson) car, which Daniel had been loaned. The blood was found on the wall, and carpet, of the car boot.
4	There may also have been signs that someone had tried to get rid of the blood stains in the car.
5	Daniel's Jacket, shoes and jeans were also found with blood on them.
6	A car that matched Daniels girlfriend's car, which he had been loaned, was seen on CCTV - by a forensic video analyst called Allister Inglis – leaving Livingston the night Jean disappeared.
7	Blood was also found on the exterior of Daniels girlfriend's car by specialist analysers in England 16 months after Jeans Disappearance.

8	Pc Simon Taylor (aged 32) stated that "all the family seemed distressed apart from Daniel".
9	Daniel told police that on the 13th of January 2012 he was in Edinburgh "checking his shifts", but police have since discovered, from tracing his mobile phone, that he was actually near Linlithgow.
10	The accused denies that the blood stains are Jean Carr's.
11	There were 64 blood stains that were present in the Car, and only three of them matched Jean's DNA profile.
12	Judge said that "jurors should not take into account previous trials (i.e., Daniel's pending court vignette that he had argued with his mother about) as they are not important in the present trial."
13	Jeans sister Amy told the court that Jean could be aggressive and could sometimes act out of character.
14	No crime scene was ever found which linked Daniel to the murder.
15	The argument between Daniel and Jean ended with Jean leaving the house, which Daniel said was normal. However, Daniel says this was the last time he saw his mother.
16	Daniel denies murdering his mother.

Vignette 9

Opening statement:

On August 26th 2014 prostitute Ellen McCrae (aged 26), went missing in Edinburgh near Leith docks. She lived in Edinburgh, and turned to prostitution to pay for her drug habit after her boyfriend David Herschel introduced her to drugs. Ellen McCrae was found dead, battered and half naked whilst being covered by a curtain near a bus stop in Portobello. Cause of death is thought to have been strangulation by an S & M collar. 118 injuries were found on her body, which included fractures to her cranium and jaw, and shattered cheekbones. Teeth were missing, which may have been caused by blows to the head from a hammer. The accused is Bruce Stark (aged 43) who is a joiner to trade.

Number	Evidence
1	Mr Stark said that he had been having sex with Ms McCrae for a period of 4 months prior to her death.
2	Several prostitutes said that Mr Stark was responsible for Ms Ellen's death, as he was known by local prostitutes for enjoying S & M and his "violent sexual tendencies".
3	Stark was known as the "beast" by many women, and was a notorious customer.
4	Several prostitutes suggested that Stark had hospitalised them in the past.
5	One prostitute, who asked to remain unnamed, said "Bruce would also have sex with us, and refuse to pay".
6	A curtain similar to the one Ellen was found in had been seen in Mr Starks van previously by his neighbour John Thomson.
7	Mr stark had been acting strangely at his home, which was not far from the murder scene, the day of Ellen's murder. This was reported by Mr Starks neighbour (Steven Rodgers).

8	Mr stark said that the statement he gave the police about being in Leith docks when Ellen disappeared was wrong, and that the police officer had made an error when taking Mr Starks statement.
9	Mr stark, and Defence Lawyer Jean Banner, lodged a special defence of Alibi. Mr Stark said he was working when Ellen went missing.
10	Stark admitted "I knew my DNA would be found on Ellen's underwear as I had paid her for sex the day previous".
11	The defence proposed that another person may have been the person who the prostitutes called "the beast". This named person was a previously convicted murderer called Howard Stark.
12	The court also heard how David Herschel (Ellen's boyfriend) had previous instances of hitting Ellen.
13	The defence's closing statement was "Yes, the DNA evidence from the semen shows that Mr Stark was intimate with Ms McCrae. However, it does not show he murdered Ellen, or that he was violent in anyway".

Information sheet, Consent form and Debrief for Pilot

<div align="center">

Information sheet

</div>

My name is Lee Curley, and I am a Postgraduate student from the School of Life, Sport & Social Sciences at Edinburgh Napier University. The title of my project is: **"Is the Jury Still Out? The Decision Making Strategies of Jurors**".

This is a pilot for a future experiment. I am looking for volunteers to participate in the project. There are no criteria (e.g. gender, race, and health). I am looking for *around* 25 participants in my pilot project.

If you agree to participate in the study, there will be a set procedure you will have to go through. This includes reading through each of the trials and rating the evidence and the trials. How long the experiment lasts will vary between participants, there is no set limit. The average time should be approximately **50 minutes.**

All data will be anonymised (un-identifiable) as much as possible. Your name will be replaced with a participant number, *i.e. participant 1*, and it will not be possible for you to be identified in any reporting of the data gathered. All data collected will be kept in a secure place (e.g. stored on a pc that is password protected) **to which only the researcher will have access**. The data will be kept till the research is published, following which all data that could identify you will be destroyed. Likewise, the data will be presented at conferences.

If you have any further questions, you are welcome to contact me, or my director of studies:

Lee Curley (BSc Hons)	Dr Rory Maclean
School of Life, Sport & Social Sciences	School of Life, Sport & Social Sciences
Edinburgh Napier University	Edinburgh Napier University
Sighthill Campus	Sighthill Campus
Sighthill Court	Sighthill Court
Edinburgh EH11 4BN	Edinburgh EH11 4BN
Email: 10004435@live.napier.ac.uk	Email: r.maclean@napier.ac.uk
Tel: (0131) 5716	Tel: (0131) 455 6148

If you would like to contact an independent person, who knows about this project but is not involved in it, you are welcome to contact Alex McIntyre; who is my independent advisor. Her contact details are given below:

Dr Alex McIntyre: Lecturer;

Faculty of Health, Life & Social Sciences; Edinburgh Napier University

Sighthill Campus,

Sighthill Court,

Edinburgh EH11 4BN,

Email: A.McIntyre@Napier.ac.uk).

If you have:

- Read and understood this information sheet,

- All questions you had have now been answered,

- And you would now like to be a participant in the study,

Then please now see the consent form.

"**Is the Jury Still Out? The Decision Making Strategies of Jurors** ."

Consent form

I have **read and understood** the information sheet and this consent form. I have had an **opportunity to ask questions** about my participation.

I understand that I am under **no obligation** to take part in this study.

I **understand** that I have the right to **withdraw** from this study at any stage without giving any reason.

I agree to participate in this study.

Name of participant: _____

Signature of participant: _____

Signature of researcher: _____

Date: _____

Contact details of the researcher:

Name of researcher: Lee Curley (Bsc Hons)

Address: PhD, Psychology,

School of Life, Sport & Social Sciences,

Edinburgh Napier University,

Sighthill Campus, Sighthill Court,

Edinburgh, EH11 4BN,

Room number: 2.B.46.

Email: 10004435@live.napier.ac.uk

Tel: (0131) 5716

<u>**Debrief**</u>

The true aims of this pilot research relate to the strength of the evidence. The information you have just given me will allow me to design my research. Also, it must be mentioned that the data will not be used I relation to future court appeals. This was mentioned to increase ecological validity (the realism of the experiment).

Please tick here if you want your data to be used

If you suffer any distress from participating in this experiment please contact the Samaritans at <u>:</u> <u>jo@samaritans.org</u>.

Additionally, you can contact me at:<u>10004435@.live.napier.ac.uk</u>, my supervisor Rory Maclean at: <u>r.maclean@napier.ac.uk</u>.

Finally, if you wish to contact someone idependent, you can contact Alex McIntyre- previously mentioned- at: email: <u>A.McIntyre@Napier.ac.uk</u>.

Do you have any questions regarding the experiment or my research? Please do not hesitate to ask.

Thanks again for all your help.

Information Sheet, Consent Form and debrief sheet for First Quasi-Experiment

Information sheet

My name is Lee Curley, and I am a Postgraduate student from the School of Life, Sport & Social Sciences at Edinburgh Napier University. The title of my project is: **"Is the Jury Still Out? The Decision Making Strategies of Jurors**".

This study will explore how jurors make decisions, and what may affect these decisions. The findings of the project will be useful in a forensic; and legal setting.

I am looking for volunteers to participate in the project. There are no criteria (e.g. gender, race, and health). I am looking for *around* 100 participants in my project.

If you agree to participate in the study, there will be a set procedure you will have to go through. Firstly, you will be given a legal questionnaire to fill out. Then you will see 9 separate criminal trials, which you will be asked to make a verdict on. There are three verdicts you can make; guilty, not guilty and not proven. As well as making a verdict on the trials, you will also be asked to rate the individual pieces of evidence. The computer program (super lab) that you will be shown shortly, will explain this in more detail. How long the experiment lasts will vary between participants, there is no set limit. The average time should be approximately **50 minutes.**

All data will be anonymised (un-identifiable) as much as possible. Your name will be replaced with a participant number, *i.e. participant 1*, and it will not be possible for you to be identified in any reporting of the data gathered. All data collected will be kept in a secure place (e.g. stored on a pc that is password protected) **to which only the researcher will have access**. The data will be kept till the research is published, following which all data that could identify you will be destroyed. Likewise, the data will be presented at conferences.

If you have any further questions, you are welcome to contact me, or my director of studies:

Lee Curley (BSc Hons)	Dr Rory Maclean
School of Life, Sport & Social Sciences	School of Life, Sport & Social Sciences
Edinburgh Napier University	Edinburgh Napier University
Sighthill Campus	Sighthill Campus
Sighthill Court	Sighthill Court
Edinburgh EH11 4BN	Edinburgh EH11 4BN
Email: 10004435@live.napier.ac.uk	Email: r.maclean@napier.ac.uk
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If you would like to contact an independent person, who knows about this project but is not involved in it, you are welcome to contact Alex McIntyre; who is my independent advisor. Her contact details are given below:

Dr Alex McIntyre: Lecturer;

Faculty of Health, Life & Social Sciences; Edinburgh Napier University

Sighthill Campus,

Sighthill Court,

Edinburgh EH11 4BN,

Email: A.McIntyre@Napier.ac.uk).

If you have:

- Read and understood this information sheet,

- All questions you had have now been answered,

- And you would now like to be a participant in the study,

Then please now see the consent form.

"**Is the Jury Still Out? The Decision Making Strategies of Jurors .**"

Consent form

I have **read and understood** the information sheet and this consent form. I have had an **opportunity to ask questions** about my participation.

I understand that I am under **no obligation** to take part in this study.

I **understand** that I have the right to **withdraw** from this study at any stage without giving any reason.

I agree to participate in this study.

Name of participant: _____

Signature of participant: _____

Signature of researcher: _____

Date: _____

Contact details of the researcher:

Name of researcher: Lee Curley (Bsc Hons)

Address: PhD, Psychology,

School of Life, Sport & Social Sciences,

Edinburgh Napier University,

Sighthill Campus, Sighthill Court,

Edinburgh, EH11 4BN,

Room number: 2.B.46.

Email: 10004435@live.napier.ac.uk

Tel: (0131) 5716

Debrief

The true aims of this research relate to how jurors make decisions. The information you have just given me will allow me to find out what variables relate to the point when someone makes a decision, and how accurate juror verdicts are. Specifically though, this research aims to focus on how much and what type of information jurors use when making decisions. The implications for this research may be great in regards to juror decision making, and I therefore appreciate the help that you have given me.

Also, it must be mentioned that the data will not be used in relation to future court appeals. This was mentioned to increase ecological validity (the realism of the experiment).

Thanks for your participation throughout this experiment. Although, you can still withdraw your data if you want, and do not have to give a reason.

Please tick here if you want your data to be used

If you suffer any distress from participating in this experiment please contact the Samaritans at : jo@samaritans.org.

Additionally, you can contact me at:10004435@.live.napier.ac.uk,or my supervisor Rory Maclean at: r.maclean@napier.ac.uk.

Finally, if you wish to contact someone idependent, you can contact Alex McIntyre- previously mentioned- at: email: A.McIntyre@Napier.ac.uk.

Do you have any questions regarding the experiment or my research? Please do not hesitate to ask.

Thanks again for all your help.

Poster for Pilot and First Quasi-Experiment

Is the Jury Still Out?
The Decision Making Strategies of Jurors

The study aims to:

1. To look at legal decision making strategies of jurors (legal laymen).
2. To see what decision making strategies are most efficient.
3. Theory testing.

Participants required for a legal psychology experiment

Sessions take place at the Sighthill campus of Edinburgh Napier University, and will last approximately 50 minutes.

Each participant will complete a series of short decision making tasks, which focus on murder trials.

If you are interested in taking part in this study or would like more information please contact:

Lee Curley (psychology PhD student)
Email: 10004435@live.napier.ac.uk,
or telephone: 07754666180

Table 19 highlights that consecutive vignettes do not have a common correlation coefficient, which highlighted that the M-dependent correlation matrix was inappropriate for the current data set.

Table 19

Correlations between consecutive vignettes to test of M-dependent correlation matrix appropriate.

Kendall's Tua_B correlations			
Vignettes Correlations	coefficients	p value	Number
One and Two	0.567	<.001	60
Two and Three	0.436	0.001	60
Three and Four	0.651	<.001	60
Four and Five	0.728	<.001	60
Five and Six	0.651	<.001	58
Six and Seven	0.478	<.001	58
Seven and Eight	0.528	<.001	60
Eight and Nine	0.644	<.001	60

11. Appendix C

Materials for Second Quasi-Experiment

Researcher sheet for experiment

Vignette 1

Georgina Hamill (aged 21) found dead in her room, in Edinburgh, on the 26th of August 2015. Time of death is thought to be between 11 pm on the 25th of August and 3 am on the morning of the 26th. Cause of death was thought to be asphyxiation. She had rope burns around her neck, which suggests she may have been choked to death. Bruising was also found on her wrists, which may have suggested that she was being held against her will. There were no other injuries present on the victim. The suspect is Luke Smith (aged 22). He is a local window cleaner.

Starting Likelihood

Evidence

Prosecution asks Julie Peterson, an eyewitness: "Did you see Luke anywhere near Georgina's flat on the 25th or 26th?"

Julie Peterson: "Luke was hovering around Georgina's house on the 25th of August at around half 11. He was sitting outside of Georgina's flat on her wall. I remember thinking it was strange at the time".

Second likelihood

Defence: "Where were you coming from, Ms Peterson, on the date mentioned?"

Julie Peterson:" I was coming from the Cross Keys (a local pub down the road) after meeting some friends for some drinks."

Defence: "Is there a chance that your intoxicated state may have caused you to misidentify Luke? And please remember you are under oath?"

Julie: "I suppose."

Third likelihood

Prosecution: "Luke's room was investigated by the police. A rope was found that had a positive match with Georgina's DNA. Special Witness Dr Miguel Sutton will now be called to the witness stand."

Dr Miguel Sutton: "There is 1 in 1000 chance that someone other than Ms Georgina Hamilton's DNA would match the DNA found on the rope in Mr Luke Smith's room."

Fourth likelihood

Defence: "Is it true, Dr Sutton, in Edinburgh, with a population of 487,500, that there is a chance that someone else's DNA may also have matched the DNA found on the rope in Mr Luke Smith's room?"

Dr Miguel Sutton: "That is true."

Fifth likelihood

Prosecution: "I would now like to call Gregory McAvoy to the witness stand. Is it true that Mr Luke Smith confided in you about Ms Georgina Hamilton's death?"

Gregory McAvoy: "Yes. He told me that he was having an affair with Ms Georgina Hamilton. He said that Georgina was going to tell Luke's wife and he had to shut her up."

Prosecution: "Elaborate. Did he say he killed her?"

Gregory McAvoy: "He said he pushed her to the floor and tied the rope round her neck. Then he strangled her using a rope, and had kept the rope as a reminder of what he had done."

Sixth likelihood

Defence: "If this is true why did you not contact the police at the time?"

Gregory McAvoy: "I was in shock. I did not want to believe that my mate had done such a horrible act."

Defence: "Is it not true that you and Luke Smith had recently fallen out over money issues?"

Gregory McAvoy: "Yes. We work together and he had lied to me over the money he was earning from his window cleaner run."

Seventh likelihood

Prosecution: "I would like to call Mr Luke Smith to give testimony… Luke did you murder Georgina by holding her against her will and strangling her with a rope?"

Luke Smith: "No. Of course not. I was nowhere near her house when she died. I was at walking the dog down portabella coast. "

Prosecution: "Firstly, can anyone support your alibi? And, can you remember how the rope got into your bedroom?"

Luke Smith: "No! But, I use rope to tie my ladders together."

Prosecution: "How Could Georgina's DNA end up on your rope, then?"

Luke Smith: "I DON'T KNOW. Maybe she was mucking about with it one time when I was cleaning her windows. I am not sure."

Eighth likelihood

Defence: "Luke, is it true you have a receipt from a local garage near portabella and the time on the receipt states that you got fuel and bought a mars bar at 11:30 on the 25th of August 2015?"

Luke Smith: "Yeah, that is true. Once I walked the dog I went to a garage and put fuel in my car. I was nowhere near Georgina's house."

Ninth likelihood

Prosecution: "In summary, this trial has shown that a young man was so fuelled by guilt of cheating on his wife, and so scared of the consequences that he thought would kill an innocent young girl in order to 'shut her up' permanently."

Tenth likelihood

Defence: "The evidence does not add up. The witness could be mistaken. The DNA evidence is not fool proof and there is evidence suggesting that Luke Smith was not anywhere near Georgina's house."

Eleventh likelihood

Tenth Strength

Final verdict:……………………….

Threshold/verdict sheet

Vignette 1

Georgina Hamill (aged 21) found dead in her room, in Edinburgh, on the 26th of August 2015. Time of death is thought to be between 11 pm on the 25th of August and 3 am on the morning of the 26th. Cause of death was thought to be asphyxiation. She had rope burns around her neck, which suggests she may have been choked to death. Bruising was also found on her wrists, which may have suggested that she was being held against her will. There were no other injuries present on the victim. The suspect is Luke Smith (aged 22). He is a local window cleaner.

Prosecution asks Julie Peterson, an eyewitness: "Did you see Luke anywhere near Georgina's flat on the 25th or 26th?"

Julie Peterson: "Luke was hovering around Georgina's house on the 25th of August at around half 11. He was sitting outside of Georgina's flat on her wall. I remember thinking it was strange at the time".

First Verdict ☐

Defence: "Where were you coming from, Ms Peterson, on the date mentioned?"

Julie Peterson:" I was coming from the Cross Keys (a local pub down the road) after meeting some friends for some drinks."

Defence: "Is there a chance that your intoxicated state may have caused you to misidentify Luke? And please remember you are under oath?"

Julie: "I suppose."

Second Verdict ☐

Prosecution: "Luke's room was investigated by the police. A rope was found that had a positive match with Georgina's DNA. Special Witness Dr Miguel Sutton will now be called to the witness stand."

Dr Miguel Sutton: "There is 1 in 1000 chance that someone other than Ms Georgina Hamilton's DNA would match the DNA found on the rope in Mr Luke Smith's room."

Third Verdict ☐

Defence: "Is it true, Dr Sutton, in Edinburgh, with a population of 487,500, that there is a chance that someone else's DNA may also have matched the DNA found on the rope in Mr Luke Smith's room?"

Dr Miguel Sutton: "That is true."

Fourth Verdict ☐

Prosecution: "I would now like to call Gregory McAvoy to the witness stand. Is it true that Mr Luke Smith confided in you about Ms Georgina Hamilton's death?"

Gregory McAvoy: "Yes. He told me that he was having an affair with Ms Georgina Hamilton. He said that Georgina was going to tell Luke's wife and he had to shut her up."

Prosecution: "Elaborate. Did he say he killed her?"

Gregory McAvoy: "He said he pushed her to the floor and tied the rope round her neck. Then he strangled her using a rope, and had kept the rope as a reminder of what he had done."

Fifth Verdict

Defence: "If this is true why did you not contact the police at the time?"

Gregory McAvoy: "I was in shock. I did not want to believe that my mate had done such a horrible act."

Defence: "Is it not true that you and Luke Smith had recently fallen out over money issues?"

Gregory McAvoy: "Yes. We work together and he had lied to me over the money he was earning from his window cleaner run."

Sixth Verdict

Prosecution: "I would like to call Mr Luke Smith to give testimony… Luke did you murder Georgina by holding her against her will and strangling her with a rope?"

Luke Smith: "No. Of course not. I was nowhere near her house when she died. I was at walking the dog down portabella coast. "

Prosecution: "Firstly, can anyone support your alibi? And, can you remember how the rope got into your bedroom?"

Luke Smith: "No! But, I use rope to tie my ladders together."

Prosecution: "How Could Georgina's DNA end up on your rope, then?"

Luke Smith: "I DON'T KNOW. Maybe she was mucking about with it one time when I was cleaning her windows. I am not sure."

Seventh Verdict

Defence: "Luke, is it true you have a receipt from a local garage near portabella and the time on the receipt states that you got fuel and bought a mars bar at 11:30 on the 25th of August 2015?"

Luke Smith: "Yeah, that is true. Once I walked the dog I went to a garage and put fuel in my car. I was nowhere near Georgina's house."

Eighth Verdict

Prosecution: "In summary, this trial has shown that a young man was so fuelled by guilt of cheating on his wife, and so scared of the consequences that he thought would kill an innocent young girl in order to 'shut her up' permanently."

Ninth Verdict

Defence: "The evidence does not add up. The witness could be mistaken. The DNA evidence is not fool proof and there is evidence suggesting that Luke Smith was not anywhere near Georgina's house."

Tenth Verdict

Vignette 2

Sophie Lithgow (aged 23) was found dead on a beach, missing clothes, near Longniddry on 15th of July 2015. Time of death is thought to be between 1pm and 4am. Death was thought to be caused by incision found in her neck. Additionally, she was found with slashes across her wrists, and ankles. She was also stabbed 14 separate times across her abdomen and neck. In addition, bruising was found on her body, which may indicate that she put an up a fight during the events that led to her death. The suspect of the murder is Ben Hooper. He is a local guitar teacher.

Starting Likelihood

Prosecution: "Firstly, I would like to call Hannah Shephard (an eyewitness) to the stand. Hannah, where were you on the 15th of July 2015? And did you see anything out of the ordinary?"

Hannah Shephard: "I was walking the beach with my dog. Yes I did, actually. I saw Ben standing over a body. He was just standing there looking at her. He seemed expressionless."

Second likelihood ☐

Defence: "Are you sure it was Ben? It couldn't have been someone else?"

Hannah Shephard: "Well, It was dark but I am fairly sure it was Ben."

Defence: "How sure?"

Hannah Shephard: "I am 60 percent sure it was him."

Third Likelihood ☐

Prosecution: "A knife was found in Ben Hooper's apartment with details that matched the stab wounds of Sophie Lithgow. Additionally, DNA evidence that matched the victim were found. Dr Melisa McVeigh, can you use your forensic knowledge to enlighten us more?"

Dr Melisa McVeigh: "The knife had DNA that matched with Sophie Lithgow on it. The probability of this belonging to someone else is 1 in 1000."

Fourth Likelihood ☐

Defence: "Is there a possibility, however, that the blood may be on the knife in Bens flat as she suffered with depression and was known to self-harm?"

Dr Melisa McVeigh:" Yes…this is possible."

Fifth Likelihood ☐

Prosecution: "I would like to call Alex Maine to the stand. Is it true that Ben confided in you over the death of Sophie?"

Alex Maine: "Yes. Ben said he had found texts from Sophie's phone. She had been texting a guy called Joe. The texts were rather explicit and apparently mentioned times they had sex. Ben said he was so angry with this that he confronted her about it. He said that the argument led to a fight. This led to Ben stabbing Sophie and cutting her neck."

Sixth Likelihood ☐

Defence: "Why didn't you contact the police when Ben told you this?"

Alex Maine: "Initially, I was in shock. I couldn't believe that Ben could do this to Sophie. But, I saw the press conference on Television asking for more information and had to help".

Defence: "Are you sure that your sense of morality did not occur when you caught Ben Hooper sleeping with your own wife?"

Alex Maine: "The issues relating to me, my wife's, and Bens personal life have nothing to do with this trial."

Seventh Likelihood

Sixth Strength

Prosecution: "I would like to ask Ben Hooper to the stand. Ben, did you kill Sophie Lithgow in cold blood?"

Ben Hooper: "Of course not. I love her. I could never have killed her. That question is ridiculous".

Prosecution: "Where were you on the night of Ms Sophie Lithgow's murder?"

Ben Hooper: "I was seeing my little brother. We were watching the football".

Prosecution: "Well, CCTV images suggest that your car was near Longniddry that night."

Eighth Likelihood

Defence: "Is it not true, Ben Hooper, that your car had been stolen the week prior and you had not reported it to the police yet?"

Ben Hooper: "This is true. My car had been stolen the week before. But, I had not reported it to the police yet as I had been busy with my work. Plus, Sophie had been suffering with depression for a while and therefore most of my spare time was devoted to her."

Ninth Likelihood

Prosecution: "In conclusion, Ben Hooper found out that Sophie had been having an affair. He was so infuriated that they ended up fighting and in his rage he slit her throat and stabbed her. He then took her to the beach and dumped the body."

Tenth Likelihood

Defence: "Ben did not kill Sophie. He was with his brother. Sophie's killer is still out there. The facts do not add up. The evidence supporting the prosecution is circumstantial and can be explained by Sophie's self-harming and the grand theft auto that Ben was subjected too."

Eleventh Likelihood

Final Verdict:………………………

Vignette 2

Sophie Lithgow (aged 23) was found dead on a beach, missing clothes, near Longniddry on 15th of July 2015. Time of death is thought to be between 1pm and 4am. Death was thought to be caused by incision found in her neck. Additionally, she was found with slashes across her wrists, and ankles. She was also stabbed 14 separate times across her abdomen and neck. In addition, bruising was found on her body, which may indicate that she put an up a fight during the events that led to her death. The suspect of the murder is Ben Hooper. He is a local guitar teacher.

Prosecution: "Firstly, I would like to call Hannah Shephard (an eyewitness) to the stand. Hannah, where were you on the 15th of July 2015? And did you see anything out of the ordinary?"

Hannah Shephard: "I was walking the beach with my dog. Yes I did, actually. I saw Ben standing over a body. He was just standing there looking at her. He seemed expressionless."

First Verdict ☐

Defence: "Are you sure it was Ben? It couldn't have been someone else?"

Hannah Shephard: "Well, It was dark but I am fairly sure it was Ben."

Defence: "How sure?"

Hannah Shephard: "I am 60 percent sure it was him."

Second Verdict ☐

Prosecution: "A knife was found in Ben Hooper's apartment with details that matched the stab wounds of Sophie Lithgow. Additionally, DNA evidence that matched the victim were found. Dr Melisa McVeigh, can you use your forensic knowledge to enlighten us more?"

Dr Melisa McVeigh: "The knife had DNA that matched with Sophie Lithgow on it. The probability of this belonging to someone else is 1 in 1000."

Third Verdict ☐

Defence: "Is there a possibility, however, that the blood may be on the knife in Bens flat as she suffered with depression and was known to self-harm?"

Dr Melisa McVeigh:" Yes…this is possible."

Fourth Verdict ☐

Prosecution: "I would like to call Alex Maine to the stand. Is it true that Ben confided in you over the death of Sophie?"

Alex Maine: "Yes. Ben said he had found texts from Sophie's phone. She had been texting a guy called Joe. The texts were rather explicit and apparently mentioned times they had sex. Ben said he was so angry with this that he confronted her about it. He said that the argument led to a fight. This led to Ben stabbing Sophie and cutting her neck."

Fifth Verdict ☐

Defence: "Why didn't you contact the police when Ben told you this?"

Alex Maine: "Initially, I was in shock. I couldn't believe that Ben could do this to Sophie. But, I saw the press conference on Television asking for more information and had to help".

Defence: "Are you sure that your sense of morality did not occur when you caught Ben Hooper sleeping with your own wife?"

Alex Maine: "The issues relating to me, my wife's, and Bens personal life have nothing to do with this trial."

Sixth Verdict ☐

Prosecution: "I would like to ask Ben Hooper to the stand. Ben, did you kill Sophie Lithgow in cold blood?"

Ben Hooper: "Of course not. I love her. I could never have killed her. That question is ridiculous".

Prosecution: "Where were you on the night of Ms Sophie Lithgow's murder?"

Ben Hooper: "I was seeing my little brother. We were watching the football".

Prosecution: "Well, CCTV images suggest that your car was near Longniddry that night."

Seventh Verdict ☐

Defence: "Is it not true, Ben Hooper, that your car had been stolen the week prior and you had not reported it to the police yet?"

Ben Hooper: "This is true. My car had been stolen the week before. But, I had not reported it to the police yet as I had been busy with my work. Plus, Sophie had been suffering with depression for a while and therefore most of my spare time was devoted to her."

Eighth Verdict

Prosecution: "In conclusion, Ben Hooper found out that Sophie had been having an affair. He was so infuriated that they ended up fighting and in his rage he slit her throat and stabbed her. He then took her to the beach and dumped the body."

Ninth Verdict

Defence: "Ben did not kill Sophie. He was with his brother. Sophie's killer is still out there. The facts do not add up. The evidence supporting the prosecution is circumstantial and can be explained by Sophie's self-harming and the grand theft auto that Ben was subjected too."

Tenth Verdict

Vignette 3

Melissa Brett (aged 19) was found dead in her bathroom, in Glasgow, on the 2nd of March 2014. Time of death is thought to between 10 pm on the 2nd of March and 2 am on the morning of the 3rd. Cause of death was thought to be Poisoning. She was found with a fatal amount, 100mg, of conium (a plant indigenous to Europe). Pathologist reports have suggested that the poison caused her respiratory system to shut down. No physical injuries were shown on the victim, however. The suspect is Aaron Kerr (aged 22). He is a PhD botanist student.

Evidence

Starting Likelihood [   ]

Prosecution asks Barbara Milner, an eyewitness: "Did you see Aaron Kerr anywhere near Melisa's flat on the 2nd or 3rd?"

Barbara: "Yeah. I am Melissa's flatmate and Aaron was in the flat around 10pm. He did not stay long and I did not hear Melissa walk him to the door".

Second likelihood [   ]

Defence: "Are you sure it was Aaron?"

Barbara: "Well, I heard a guy's voice, and Melisa and Aaron had been dating for a while now. So, yeah, I'm sure it was him."

Defence: "Is there a chance that it could have been another man? And, please remember, you are under oath?"

Barbara: "I suppose".

Third likelihood [   ]

Prosecution: "Aaron did work with plants, such as conium (i.e. the plant used to make the poison). Special Witness Dr Steven Malone will now be called to the witness stand."

Dr Steven Malone: "I would suggest that there is a strong possibility that Aaron poisoned Melissa. This is because of the experience he has with plants that produce such toxins"

Fourth likelihood [   ]

Defence: "Is it not true, Dr Steven Malone, that people have died from such poisoning in the past indirectly from animals. In other words, by eating game birds, which Melissa had done on the night of her death, which eat Conium, is it likely that the toxin was then passed into Melissa's system?"

Dr Steven Malone: "That is true."

Fifth likelihood [   ]

Prosecution: "I would now like to call James Peterson (Mr Aaron Kerr's Colleague) to the witness stand. Is it true that Mr Aaron Kerr confided in you about Ms Melissa Brett's death?"

James: "Yes. He told me that Melissa was unsure whether she wanted to have a committed relationship with him or not. She strongly suggested she wanted to focus more on her own studies. "

Prosecution: "Elaborate. Did he say he killed her?"

James: "He said he collected the conium, and mixed it in a smoothie to give her with dinner. He said he couldn't handle the idea of her being with someone else so he had to kill her."

Sixth likelihood   [   ]

Defence: "If this is true why did you not contact the police at the time?"

James:" I was in shock. I thought it was some kind of sick joke"

Defence: "Is it not true that James had recently gained funding for his PhD where you had failed?"

James:" Yes. You are correct. He was successful in funding whereas I had failed".

Seventh likelihood   [   ]

Prosecution: I would like to call Mr Aaron Kerr to give testimony… Aaron did you murder Melissa by poisoning her?"

Aaron: "No. Of course not. I was nowhere near her house that night. I was working late in the laboratory. "

Prosecution: "Can anyone support your alibi?

Aaron: "No! I was alone that night"

Eighth likelihood   [   ]

Defence: "Aaron, you have a digital record on your computer of signing in to a computer at your university at around 10:05pm?"

Aaron: "Yeah, that is true. I also emailed my PhD supervisor, from that computer, at around 11pm."

Ninth likelihood   [   ]

Prosecution: "In summary, this trial has shown a smart and talented young man let his love for someone over-throw his reasoning abilities. He used his skills in botany to ensure no other male could be in relationship with her again."

Tenth likelihood   [   ]

Defence: "The evidence does not add up. The witness may not have heard the right male. There was other ways the toxin could have entered her system and digital records show that Aaron was not In Melissa's flat during her death".

Eleventh likelihood   [   ]

Final Verdict:…………………………….

Vignette 3

Melissa Brett (aged 19) was found dead in her bathroom, in Glasgow, on the 2nd of March 2014. Time of death is thought to between 10 pm on the 2nd of March and 2 am on the morning of the 3rd. Cause of death was thought to be Poisoning. She was found with a fatal amount, 100mg, of conium (a plant indigenous to Europe). Pathologist reports have suggested that the poison caused her respiratory system to shut down. No physical injuries were shown on the victim, however. The suspect is Aaron Kerr (aged 22). He is a PhD botanist student.

Prosecution asks Barbara Milner, an eyewitness: "Did you see Aaron Kerr anywhere near Melisa's flat on the 2rd or 3rd?"

Barbara: "Yeah. I am Melissa's flatmate and Aaron was in the flat around 10pm. He did not stay long and I did not hear Melissa walk him to the door".

First Verdict [ ]

Defence: "Are you sure it was Aaron?"

Barbara: "Well, I heard a guy's voice, and Melisa and Aaron had been dating for a while now. So, yeah, I'm sure it was him."

Defence: "Is there a chance that it could have been another man? And, please remember, you are under oath?"

Barbara: "I suppose".

Second Verdict [ ]

Prosecution: "Aaron did work with plants, such as conium (i.e. the plant used to make the poison). Special Witness Dr Steven Malone will now be called to the witness stand."

Dr Steven Malone: "I would suggest that there is a strong possibility that Aaron poisoned Melissa. This is because of the experience he has with plants that produce such toxins"

Third Verdict [ ]

Defence: "Is it not true, Dr Steven Malone, that people have died from such poisoning in the past indirectly from animals. In other words, by eating game birds, which Melissa had done on the night of her death, which eat Conium, is it likely that the toxin was then passed into Melissa's system?"

Dr Steven Malone: "That is true."

Fourth Verdict [ ]

Prosecution: "I would now like to call James Peterson (Mr Aaron Kerr's Colleague) to the witness stand. Is it true that Mr Aaron Kerr confided in you about Ms Melissa Brett's death?"

James: "Yes. He told me that Melissa was unsure whether she wanted to have a committed relationship with him or not. She strongly suggested she wanted to focus more on her own studies. "

Prosecution: "Elaborate. Did he say he killed her?"

James: "He said he collected the conium, and mixed it in a smoothie to give her with dinner. He said he couldn't handle the idea of her being with someone else so he had to kill her."

Fifth Verdict [ ]

Defence: "If this is true why did you not contact the police at the time?"

James:" I was in shock. I thought it was some kind of sick joke"

Defence: "Is it not true that James had recently gained funding for his PhD where you had failed?"

James:" Yes. You are correct. He was successful in funding whereas I had failed".

Sixth Verdict

Prosecution: I would like to call Mr Aaron Kerr to give testimony… Aaron did you murder Melissa by poisoning her?"

Aaron: "No. Of course not. I was nowhere near her house that night. I was working late in the laboratory. "

Prosecution: "Can anyone support your alibi?

Aaron: "No! I was alone that night"

Seventh Verdict

Defence: "Aaron, you have a digital record on your computer of signing in to a computer at your university at around 10:05pm?"

Aaron: "Yeah, that is true. I also emailed my PhD supervisor, from that computer, at around 11pm."

Eighth Verdict

Prosecution: "In summary, this trial has shown a smart and talented young man let his love for someone over-throw his reasoning abilities. He used his skills in botany to ensure no other male could be in relationship with her again."

Ninth Verdict

Defence: "The evidence does not add up. The witness may not have heard the right male. There was other ways the toxin could have entered her system and digital records show that Aaron was not In Melissa's flat during her death".

Tenth Verdict

Vignette 4

Rebecca Wright (aged 20) was found dead in her hot tub in Oban. Time of death is thought to be between 11:30pm on the 12th of July and 1:30am on the morning of the 13th. Cause of death was thought to be drowning, as she was found with water in her lungs and a low level of oxygen in her red blood cells. She was found floating in her hot tub, and hand marks were found on the back of her head, which may suggest that she had been forced under water. No other physical injuries were shown on the victim, however. The suspect is Darren Luby (aged 23). He is currently unemployed.

Evidence

Starting Point Likelihood

Prosecution asks Fiona Lusk, an eyewitness: "Did you see Darren Luby anywhere near Melisa's house on the12th or 13th of July?"

Fiona: "Yeah. I am currently lodging with Rebecca Wright and she had told me earlier in the day that her boyfriend [i.e. Darren Luby] was coming round for a bit and that they might use the hot tub. She told me to remain scarce, so I went out."

Second likelihood

Defence: "Are you sure it was Darren who was coming round?"

Fiona:" Well, that's who she told me was coming round. However, I had seen that she was getting close with the next door neighbour. His name is Tom Kitchen."

Defence: "Is there a chance that it could have been Tom who was coming round then? And please remember you are under oath."

Fiona: "I suppose".

Third likelihood

Prosecution: "Biological evidence was found that linked Darren to the murder scene. Special Witness Dr Bruce Hyde will now be called to the witness stand."

Dr Bruce: "Rebecca's DNA was found under Darren's fingernails. The chances of the DNA found under Darren's fingernails belonging to someone else is 1 in 34,000."

Fourth likelihood

Defence: "The DNA found under Darren's Fingernails may have been collected in a less suspicious way. Is that not true? Could the DNA have been collected from Darren giving Rebecca a massage earlier in the day?"

Dr Bruce: "That is true."

Fifth likelihood

Prosecution: "I would now like to call Peter Reynolds (Mr Darren Luby's Friend) to the witness stand. Is it true that Mr Darren Luby confided in you about Ms Rebecca Wright's death?"

Peter: "Yes. He told me that he was struggling financially. He said that Rebecca was really well off and that she had recently written a will. In this will she left her fortune to Darren."

Prosecution: "Please elaborate. Did he say he killed her?"

Peter: "He said he was going to kill her to inherit this money. He said he wanted to do it in a place she felt safe and intimate. He said he would get a kick out of this."

Sixth likelihood [   ]

Defence: "If this is true, why did you not contact the police at the time?"

Peter: "I was in shock. I thought it was some kind of sick joke."

Defence: "Is it not true that you and Darren had recently had a fight where he had sent you to hospital? And that you had said in front of the police, 'I will get you back for this. You wait. One day I'll get you back.' "

Peter: "Yes. We did. I cannot remember saying those words exactly. However, I do not care for you implying that I'm trying to frame Darren."

Seventh likelihood [   ]

Prosecution: "I would like to call Mr Darren Luby to give testimony… Darren did you murder Rebecca by drowning her?"

Darren: "No. Of course not. I was nowhere near her house that night. I was in during lunch. We had lunch. Then I gave her a massage. We watched a film. Then I left and went home."

Prosecution: "Can anyone support your alibi?

Darren: "No! I was alone that night."

Eighth likelihood [   ]

Defence: "Darren's phone was traced, however, and it was found that he was at home between the times of 10pm and 3am."

Ninth likelihood [   ]

Prosecution: "In summary, this trial has shown Darren to be a ruthless young man. An unemployed individual with financial worries who decided to kill his loving girlfriend in an attempt to reap the money she was willing to leave him. Biological evidence and eyewitness testimony backs up this narrative."

Tenth likelihood [   ]

Defence: "The evidence does not add up. Rebecca could have lied to the witness about who was coming round. There were other ways that Darren could have received Rebecca's DNA. Plus, there is no evidence of the suspect being at the victim's house at the time of death."

Eleventh likelihood

Tenth Strength [   ]

Final Verdict:………………………….

Vignette 4

Rebecca Wright (aged 20) was found dead in her hot tub in Oban. Time of death is thought to be between 11:30pm on the 12th of July and 1:30am on the morning of the 13th. Cause of death was thought to be drowning, as she was found with water in her lungs and a low level of oxygen in her red blood cells. She was found floating in her hot tub, and hand marks were found on the back of her head, which may suggest that she had been forced under water. No other physical injuries were shown on the victim, however. The suspect is Darren Luby (aged 23). He is currently unemployed.

Prosecution asks Fiona Lusk, an eyewitness: "Did you see Darren Luby anywhere near Melisa's house on the12th or 13th of July?"

Fiona: "Yeah. I am currently lodging with Rebecca Wright and she had told me earlier in the day that her boyfriend [i.e. Darren Luby] was coming round for a bit and that they might use the hot tub. She told me to remain scarce, so I went out."

First Verdict [   ]

Defence: "Are you sure it was Darren who was coming round?"

Fiona:" Well, that's who she told me was coming round. However, I had seen that she was getting close with the next door neighbour. His name is Tom Kitchen."

Defence: "Is there a chance that it could have been Tom who was coming round then? And please remember you are under oath."

Fiona: "I suppose".

Second Verdict [   ]

Prosecution: "Biological evidence was found that linked Darren to the murder scene. Special Witness Dr Bruce Hyde will now be called to the witness stand."

Dr Bruce: "Rebecca's DNA was found under Darren's fingernails. The chances of the DNA found under Darren's fingernails belonging to someone else is 1 in 34,000."

Third Verdict [   ]

Defence: "The DNA found under Darren's Fingernails may have been collected in a less suspicious way. Is that not true? Could the DNA have been collected from Darren giving Rebecca a massage earlier in the day?"

Dr Bruce: "That is true."

Fourth Verdict [   ]

Prosecution: "I would now like to call Peter Reynolds (Mr Darren Luby's Friend) to the witness stand. Is it true that Mr Darren Luby confided in you about Ms Rebecca Wright's death?"

Peter: "Yes. He told me that he was struggling financially. He said that Rebecca was really well off and that she had recently written a will. In this will she left her fortune to Darren."

Prosecution: "Please elaborate. Did he say he killed her?"

Peter: "He said he was going to kill her to inherit this money. He said he wanted to do it in a place she felt safe and intimate. He said he would get a kick out of this."

Fifth Verdict [   ]

Defence: "If this is true, why did you not contact the police at the time?"

Peter: "I was in shock. I thought it was some kind of sick joke."

Defence: "Is it not true that you and Darren had recently had a fight where he had sent you to hospital? And that you had said in front of the police, 'I will get you back for this. You wait. One day I'll get you back.' "

James: "Yes. We did. I cannot remember saying those words exactly. However, I do not care for you implying that I'm trying to frame Darren."

Sixth Verdict

Prosecution: "I would like to call Mr Darren Luby to give testimony… Darren did you murder Rebecca by drowning her?"

Darren: "No. Of course not. I was nowhere near her house that night. I was in during lunch. We had lunch. Then I gave her a massage. We watched a film. Then I left and went home."

Prosecution: "Can anyone support your alibi?

Darren: "No! I was alone that night."

Seventh Verdict

Defence: "Darren's phone was traced, however, and it was found that he was at home between the times of 10pm and 3am."

Eighth Verdict

Prosecution: "In summary, this trial has shown Darren to be a ruthless young man. An unemployed individual with financial worries who decided to kill his loving girlfriend in an attempt to reap the money she was willing to leave him. Biological evidence and eyewitness testimony backs up this narrative."

Ninth Verdict

Defence: "The evidence does not add up. Rebecca could have lied to the witness about who was coming round. There were other ways that Darren could have received Rebecca's DNA. Plus, there is no evidence of the suspect being at the victim's house at the time of death."

Tenth Verdict

Vignette 5

Lucy Silver (aged 22) was found dead, buried in the woods near the town of Pencaitland. Time of death is thought to be between 10:30pm on the 28th of April and 2:30am on the morning of the 29th. The cause of death was believed to be from a bullet wound that she received in her abdomen. She was found buried in the forest and was detected after she had been missing for two weeks. No other physical injuries were shown on the victim, however. The suspect is Ryan Corrigan (aged 24). He is currently working as a game-keeper on a local estate.

Evidence

Starting Likelihood ☐

Prosecution asks Jade Stevenson, an eyewitness: "Did you see Ryan Corrigan walking in the woods around the time of the suspect's death?"

Jade: "Yeah. I was walking my dog and I saw Ryan walking past me with his shotgun."

Second Likelihood ☐

Defence: "Is this a common occurrence?"

Jade: "Yes, I know Ryan well. He works at the local estate. I see him every night walking home through the woods. He normally does have his gun from work on him."

Third likelihood ☐

Prosecution: "The bullet, which is believed to have passed through Ms Lucy Silver, was found and matched to Mr Ryan Corrigan's firearm. Special Witness Dr David Blair will now be called to the witness stand."

Dr David: "The bullet found near the crime scene seems to match the firearm of Mr Corrigan. It is therefore, a reasonable assumption to make that Mr Ryan Corrigan's Gun was used to kill the victim."

Fourth likelihood ☐

Defence: "However, is it not true that unidentified DNA was found on the firearm?"

Dr David: "That is true."

Defence: "This evidence and the fact that Mr Corrigan reported his gun missing at 11:56pm on the 28th of April may suggest that Ryan's gun was stolen and used by the murderer on the victim."

Fifth likelihood ☐

Prosecution: "I would now like to call Sean McPherson [Mr Ryan Corrigan's Friend] to the witness stand. Is it true that Mr Ryan Corrigan confided in you about Ms Lucy Silver's death?"

Sean: "Yes. He told me that he had become obsessed with a jogger he had seen running past him after he had finished work. He said that he started hiding in the bushes so that he could watch her. He said he had grew angry at her for not noticing him."

Prosecution: "Please elaborate. Did he say he killed her?"

Sean: "He said he was going to show her a reason to notice him."

Sixth likelihood ☐

Defence: "Would you say that suggested murder?"

Sean: "I'm not sure. He was not a violent man. I just imagined he meant talking to her at the time. It was only after he was charged with murder that I interpreted what he said differently"

Seventh likelihood

Prosecution:" I would like to call Mr Ryan Corrigan to give testimony… Ryan did you murder Lucy by shooting her?"

Ryan: "No. Of course not. I   was walking home in the woods but I did not see Lucy that night at all."

Prosecution: "Can anyone support this?

Ryan: "No! I was alone walking home."

Eighth likelihood

Defence: "It is true, however, that the police tracked Ryan and Lucy's movements that night using their mobiles, and it was proven that the victim and the suspect mobiles were not close to one another that night."

Ninth likelihood

Prosecution: "In summary, this trial has shown Ryan to be a stalker who developed an obsession with young Lucy. This obsession drove him crazy and caused him to create an event that Lucy would notice him. Forensic evidence from the gun and eyewitness testimony suggest that Ryan is Lucy's killer."

Tenth likelihood

Defence: "The evidence does not add up. Lucy was nowhere near Ryan on the night of her death. The testimony given in this trial is inconclusive and the unknown DNA was found on the murder weapon. This shows that the real killer may still be at large."

Eleventh likelihood

Final Verdict………………………

Vignette 5

Lucy Silver (aged 22) was found dead, buried in the woods near the town of Pencaitland. Time of death is thought to be between 10:30pm on the 28th of April and 2:30am on the morning of the 29th. The cause of death was believed to be from a bullet wound that she received in her abdomen. She was found buried in the forest and was detected after she had been missing for two weeks. No other physical injuries were shown on the victim, however. The suspect is Ryan Corrigan (aged 24). He is currently working as a game-keeper on a local estate.

Prosecution asks Jade Stevenson, an eyewitness: "Did you see Ryan Corrigan walking in the woods around the time of the suspect's death?"

Jade: "Yeah. I was walking my dog and I saw Ryan walking past me with his shotgun."

First Verdict

Defence: "Is this a common occurrence?"

Jade: "Yes, I know Ryan well. He works at the local estate. I see him every night walking home through the woods. He normally does have his gun from work on him."

Second Verdict

Prosecution: "The bullet, which is believed to have passed through Ms Lucy Silver, was found and matched to Mr Ryan Corrigan's firearm. Special Witness Dr David Blair will now be called to the witness stand."

Dr David: "The bullet found near the crime scene seems to match the firearm of Mr Corrigan. It is therefore, a reasonable assumption to make that Mr Ryan Corrigan's Gun was used to kill the victim."

Third Verdict

Defence: "However, is it not true that unidentified DNA was found on the firearm?"

Dr David: "That is true."

Defence: "This evidence and the fact that Mr Corrigan reported his gun missing at 11:56pm on the 28th of April may suggest that Ryan's gun was stolen and used by the murderer on the victim."

Fourth Verdict

Prosecution: "I would now like to call Sean McPherson [Mr Ryan Corrigan's Friend] to the witness stand. Is it true that Mr Ryan Corrigan confided in you about Ms Lucy Silver's death?"

Sean: "Yes. He told me that he had become obsessed with a jogger he had seen running past him after he had finished work. He said that he started hiding in the bushes so that he could watch her. He said he had grew angry at her for not noticing him."

Prosecution: "Please elaborate. Did he say he killed her?"

Sean: "He said he was going to show her a reason to notice him."

Fifth Verdict

Defence: "Would you say that suggested murder?"

Sean:"I'm not sure. He was not a violent man. I just imagined he meant talking to her at the time. It was only after he was charged with murder that I interpreted what he said differently"

Sixth Verdict

Prosecution:" I would like to call Mr Ryan Corrigan to give testimony… Ryan did you murder Lucy by shooting her?"

Ryan: "No. Of course not. I was walking home in the woods but I did not see Lucy that night at all."

Prosecution: "Can anyone support this?

Ryan: "No! I was alone walking home."

Seventh Verdict

Defence: "It is true, however, that the police tracked Ryan and Lucy's movements that night using their mobiles, and it was proven that the victim and the suspect mobiles were not close to one another that night."

Eighth Verdict

Prosecution: "In summary, this trial has shown Ryan to be a stalker who developed an obsession with young Lucy. This obsession drove him crazy and caused him to create an event that Lucy would notice him. Forensic evidence from the gun and eyewitness testimony suggest that Ryan is Lucy's killer."

Ninth Verdict

Defence: "The evidence does not add up. Lucy was nowhere near Ryan on the night of her death. The testimony given in this trial is inconclusive and the unknown DNA was found on the murder weapon. This shows that the real killer may still be at large."

Tenth Verdict

Vignette 6

Christine Richardson (aged 20) was found dead in a bus shelter in Dalkeith. Time of death is thought to be between 1:00am and 4:30am on the 7th of February, 2015. The cause of death is believed to be from severe trauma to the cranium. It is believed that an object was hit against her head and this caused her death. The only injuries the victim sustained were to the head. There is no evidence of a fight or a struggle. The suspect is Brian Malcom (aged 23) who was the victim's boyfriend. He is currently working as a joiner for the local council [i.e. Midlothian council].

Evidence

Starting Point Likelihood

Prosecution asks Cristopher Tennent, an eyewitness: "Did you see Brian Malcom with Christine Richardson on the day of the victim's death?"

Christopher: "Yeah. The two of them were in the pub with me. They had an argument about Christine speaking to her ex-boyfriend and then they left."

Second likelihood

Defence: "Did they leave together?"

Christopher: "I'm not entirely sure. I think Brian may have actually gotten a taxi home an hour later."

Third likelihood

Prosecution: "A rock was found that had blood samples from Ms Richardson and had DNA traces of Mr Malcom. An expert witness, Dr John McRae, will now take the stand."

Dr John: "Blood was found on the rock, which matched the victim's. Similarly, DNA was found that matched the DNA of Brian Malcom. There is a 1 in 1000 chance that someone other than Brian touched the murder weapon."

Fourth likelihood

Defence: "However, is it not true that in the county of Midlothian, which Dalkeith is in, there is a population of 86,210? This means that it is not impossible that other civilians in that county may also match the DNA found on the rock?"

Dr John: "That is true."

Fifth likelihood

Prosecution: "I would now like to call Colin Bean (Mr Brian Malcom's Friend) to the witness stand. Is it true that Mr Brian Malcom confided in you about Ms Christine Richardson's death?"

Colin: "Yes. At the pub he was telling me how Christine had been sending texts to her ex-boyfriend and that he had caught her calling him. He said he was not going to lose her and that if she did not want him, then nobody could have her"

Prosecution: "Elaborate. Did he say that he killed her?"

Colin: "He said he would before he left the pub."

Sixth likelihood

Defence: "Would you say that suggested murder?"

Colin: "I'm not sure. He's not a violent man. I just imagined he meant that he was angry with her. It was only after he was charged with murder that I interpreted what he said differently. Honestly, I do not think he was capable of murder."

Seventh likelihood ☐

Prosecution: "I would like to call Mr Brian Malcom to give testimony… Brian did you murder Christine?"

Brian: "No. Of course not. We argued. She left. I got drunk and went home."

Prosecution: "Can anyone support this?"

Brian: "No! I was alone walking home."

Eighth likelihood ☐

Defence: "It is true, however, that Brian was seen on CCTV walking from the pub in the opposite direction to where Christine was found."

Ninth likelihood ☐

Prosecution: "In summary, this trial has shown Brian to be an insecure young man, who would rather kill his current girlfriend than let her go back to her ex-boyfriend. The evidence is clear cut. He followed her home and smashed her head with a rock. Intent was there."

Tenth likelihood ☐

Defence: "The evidence does not add up. Brian was shown to be walking away from the murder scene. He was not the last person with Christine and the DNA is inconclusive. There is no single piece of evidence that proves guilt beyond reasonable doubt."

Eleventh likelihood ☐

Final Verdict:……………………..

Vignette 6

Christine Richardson (aged 20) was found dead in a bus shelter in Dalkeith. Time of death is thought to be between 1:00am and 4:30am on the 7th of February, 2015. The cause of death is believed to be from severe trauma to the cranium. It is believed that an object was hit against her head and this caused her death. The only injuries the victim sustained were to the head. There is no evidence of a fight or a struggle. The suspect is Brian Malcom (aged 23) who was the victim's boyfriend. He is currently working as a joiner for the local council [i.e. Midlothian council].

Prosecution asks Cristopher Tennent, an eyewitness: "Did you see Brian Malcom with Christine Richardson on the day of the victim's death?"

Christopher: "Yeah. The two of them were in the pub with me. They had an argument about Christine speaking to her ex-boyfriend and then they left."

First Verdict ☐

Defence: "Did they leave together?"

Christopher: "I'm not entirely sure. I think Brian may have actually gotten a taxi home an hour later."

Second Verdict ☐

Prosecution: "A rock was found that had blood samples from Ms Richardson and had DNA traces of Mr Malcom. An expert witness, Dr John McRae, will now take the stand."

Dr John: "Blood was found on the rock, which matched the victim's. Similarly, DNA was found that matched the DNA of Brian Malcom. There is a 1 in 1000 chance that someone other than Brian touched the murder weapon."

Third Verdict ☐

Defence: "However, is it not true that in the county of Midlothian, which Dalkeith is in, there is a population of 86,210? This means that it is not impossible that other civilians in that county may also match the DNA found on the rock?"

Dr John: "That is true."

Fourth Verdict ☐

Prosecution: "I would now like to call Colin Bean (Mr Brian Malcom's Friend) to the witness stand. Is it true that Mr Brian Malcom confided in you about Ms Christine Richardson's death?"

Colin: "Yes. At the pub he was telling me how Christine had been sending texts to her ex-boyfriend and that he had caught her calling him. He said he was not going to lose her and that if she did not want him, then nobody could have her"

Prosecution: "Elaborate. Did he say that he killed her?"

Colin: "He said he would before he left the pub."

Fifth Verdict ☐

Defence: "Would you say that suggested murder?"

Colin: "I'm not sure. He's not a violent man. I just imagined he meant that he was angry with her. It was only after he was charged with murder that I interpreted what he said differently. Honestly, I do not think he was capable of murder."

Sixth Verdict ☐

Prosecution: "I would like to call Mr Brian Malcom to give testimony… Brian did you murder Christine?"

Brian: "No. Of course not. We argued. She left. I got drunk and went home."

Prosecution: "Can anyone support this?"

Brian: "No! I was alone walking home."

Seventh Verdict

Defence: "It is true, however, that Brian was seen on CCTV walking from the pub in the opposite direction to where Christine was found."

Eighth Strength

Prosecution: "In summary, this trial has shown Brian to be an insecure young man, who would rather kill his current girlfriend than let her go back to her ex-boyfriend. The evidence is clear cut. He followed her home and smashed her head with a rock. Intent was there."

Ninth Verdict

Defence: "The evidence does not add up. Brian was shown to be walking away from the murder scene. He was not the last person with Christine and the DNA is inconclusive. There is no single piece of evidence that proves guilt beyond reasonable doubt."

Tenth Verdict

Vignette 7

Rachel McKenzie (aged 19) was found dead in her car on a country road near east Linton. Time of death is thought to between 08:00pm and 11:00pm on the 20th of January 2015. The cause of death is believed to be from strangulation. There were marks found on her neck, which suggested that she had been strangled. Bruising on her wrists and knuckles suggests that there was a struggle. The car was found undamaged, which suggests that the killer was someone close to Rachel McKenzie. The suspect is Kieran Clark (aged 20). He is currently working as a support worker.

Evidence

Starting Point Likelihood [   ]

Prosecution asks Melinda Brussels, an eyewitness: "Was Kieran in the car with Rachel?"

Melinda: "Yeah. The two of them drove past me about 9 o'clock on the 20th of January. However, Kieran was driving the car."

Second likelihood [   ]

Defence: "Are you sure it was Kieran? Where had you been prior to seeing the victim and suspect?"

Melinda: "I am pretty sure. I was searching for my spectacles, however, as I had lost them earlier when I was walking the dog."

Defence: "You cannot be entirely sure then that Kieran was driving, can you?"

Melinda: "I suppose not."

Third likelihood [   ]

Prosecution: "Boot prints were found in the car which matched Kieran's boots. An expert witness, Dr Franklin Kyle, will now take the stand."

Dr Franklin: "Size 10 boot prints which matched the boot size of Kieran were found in the car. This does help to build a case surrounding the possible guilt of the suspect."

Fourth likelihood [   ]

Defence: "A size 10 foot size is not uncommon surely? This piece of evidence may help to narrow the search for the killer. However, surely it is not conclusive evidence that my client was there?"

Dr Franklin: "That is true. There is not conclusive biological evidence that Kieran was in the car found with the victim."

Fifth likelihood [   ]

Prosecution: "I would now like to call Greg Murray (Mr Kieran Clark's friend) to the witness stand. Is it true that Mr Kieran Clark confided in you about Ms Rachel McKenzie's death?"

Greg: "Yes! He said that they had been friends. However, Rachel had started bullying Kieran over his sexual orientation. He said that she would call him offensive words and that she got pleasure in broadcasting that he was gay to the community. This angered him."

Prosecution: "Please elaborate. Did he say he killed her?"

Greg: "Well, he said he was going to make her pay."

Sixth likelihood [   ]

Defence: "Is it not true that you and Kieran had a sexual relationship recently? Until he finished it and revealed your secret of also being homosexual?"

Greg: "Yes that is true. He broke my heart. He was also a hypocrite. He told Rachel about our relationship. She told everyone. I think prison would be such the place for a spiteful man like Kieran."

Seventh likelihood

Prosecution: "I would like to call Mr Kieran Clark to give testimony… Kieran did you murder Rachel?"

Kieran: "No. Of course not. We were best friends. I am as saddened by her death as much as anybody. I was at home all night the night she died."

Prosecution: "Can anyone support this?"

Kieran: "No! I was home alone."

Eighth likelihood

Seventh Strength

Defence: "CCTV images from the shop across from Kieran's home showed that Kieran entered his front door at 6:00pm and no one left from the front door the rest of the night."

Ninth likelihood

Prosecution: "In summary, this trial has shown Kieran to have been persecuted by the victim for his sexuality. This persecution built up in the young man. This caused him to plan his murder. Driving her in her own car (as she trusted him). Stopping somewhere remote and then strangling her to death. The lack of biological evidence may have been caused by the use of gloves at the crime scene, which were easy for him to obtain as he was a support worker."

Tenth likelihood

Defence: "The evidence does not add up. No biological evidence relates Kieran to the crime scene. There may have been problems with the eyewitness' vision. And the secondary confession provided by Greg may have been out of spite. CCTV also backs up Kieran's alibi. He is innocent."

Eleventh likelihood

Final Verdict:……………………………

Vignette 7

Rachel McKenzie (aged 19) was found dead in her car on a country road near east Linton. Time of death is thought to between 08:00pm and 11:00pm on the 20th of January 2015. The cause of death is believed to be from strangulation. There were marks found on her neck, which suggested that she had been strangled. Bruising on her wrists and knuckles suggests that there was a struggle. The car was found undamaged, which suggests that the killer was someone close to Rachel McKenzie. The suspect is Kieran Clark (aged 20). He is currently working as a support worker.

Prosecution asks Melinda Brussels, an eyewitness: "Was Kieran in the car with Rachel?"

Melinda: "Yeah. The two of them drove past me about 9 o'clock on the 20th of January. However, Kieran was driving the car."

First Verdict ☐

Defence: "Are you sure it was Kieran? Where had you been prior to seeing the victim and suspect?"

Melinda: "I am pretty sure. I was searching for my spectacles, however, as I had lost them earlier when I was walking the dog."

Defence: "You cannot be entirely sure then that Kieran was driving, can you?"

Melinda: "I suppose not."

Second Verdict ☐

Prosecution: "Boot prints were found in the car which matched Kieran's boots. An expert witness, Dr Franklin Kyle, will now take the stand."

Dr Franklin: "Size 10 boot prints which matched the boot size of Kieran were found in the car. This does help to build a case surrounding the possible guilt of the suspect."

Third Verdict ☐

Defence: "A size 10 foot size is not uncommon surely? This piece of evidence may help to narrow the search for the killer. However, surely it is not conclusive evidence that my client was there?"

Dr Franklin: "That is true. There is not conclusive biological evidence that Kieran was in the car found with the victim."

Fourth Verdict ☐

Prosecution: "I would now like to call Greg Murray (Mr Kieran Clark's friend) to the witness stand. Is it true that Mr Kieran Clark confided in you about Ms Rachel McKenzie's death?"

Greg: "Yes! He said that they had been friends. However, Rachel had started bullying Kieran over his sexual orientation. He said that she would call him offensive words and that she got pleasure in broadcasting that he was gay to the community. This angered him."

Prosecution: "Please elaborate. Did he say he killed her?"

Greg: "Well, he said he was going to make her pay."

Fifth Verdict ☐

Defence: "Is it not true that you and Kieran had a sexual relationship recently? Until he finished it and revealed your secret of also being homosexual?"

Greg: "Yes that is true. He broke my heart. He was also a hypocrite. He told Rachel about our relationship. She told everyone. I think prison would be such the place for a spiteful man like Kieran."

Sixth Verdict

Prosecution: "I would like to call Mr Kieran Clark to give testimony… Kieran did you murder Rachel?"

Kieran: "No. Of course not. We were best friends. I am as saddened by her death as much as anybody. I was at home all night the night she died."

Prosecution: "Can anyone support this?"

Kieran: "No! I was home alone."

Seventh Verdict

Defence: "CCTV images from the shop across from Kieran's home showed that Kieran entered his front door at 6:00pm and no one left from the front door the rest of the night."

Eighth Verdict

Prosecution: "In summary, this trial has shown Kieran to have been persecuted by the victim for his sexuality. This persecution built up in the young man. This caused him to plan his murder. Driving her in her own car (as she trusted him). Stopping somewhere remote and then strangling her to death. The lack of biological evidence may have been caused by the use of gloves at the crime scene, which were easy for him to obtain as he was a support worker."

Ninth Strength

Defence: "The evidence does not add up. No biological evidence relates Kieran to the crime scene. There may have been problems with the eyewitness' vision. And the secondary confession provided by Greg may have been out of spite. CCTV also backs up Kieran's alibi. He is innocent."

Tenth Strength

Vignette 8

Samantha Rollo (aged 22) went missing on 22nd of July 2015. She was last seen leaving her work (at the royal infirmary; she was a nurse) at 7:00pm. She never arrived home that night. She was reported missing soon after by her husband. The police reported her as dead not long after her disappearance. Her body has not been found. However, one tooth was found, which strongly suggests that she was murdered. No cause of death is known. The suspect is Liam Dickson (aged 28. He is currently working as a surgeon at the Royal infirmary.

Evidence

Starting Likelihood Point

Prosecution asks Ellen Smith, an eyewitness and colleague: "Is it true that Liam Dickson and Samantha Rollo were having an affair? And where was Samantha after work?"

Ellen: "Yeah. I had caught them once in the on-call room. They both tried to keep it a secret as they were both married. She had told me that she was going to see Liam and that she was going to end it with him and that she loved her husband."

Prosecution: "So the last person Samantha saw would have be Liam?"

Ellen: "Yeah, I think so".

Second likelihood

Defence: "Is it not true that Samantha did later tell you that she had chosen to tell Liam by text that it was over?"

Ellen: "Yeah. That is correct. She did end up texting him that she wanted to end the affair. She then rang him at lunch to tell him it was over."

Defence: "Do you think this caused Samantha to go home after work then? Rather than to Liam's?"

Ellen: "It is possible. I guess there would be no reason to see him after the phone call."

Third likelihood

Prosecution: "A tooth that belonged to Ms Rollo was found in Mr Liam Dickson's apartment. An expert witness, a forensic psychologist Dr Simon Cooke, will now discuss further."

Dr Simon: "It is common in cases where individuals have murdered someone for the killer to keep a little token. The suspect may have seen the tooth as a trophy and kept it to remember his victim. The tooth may also have been kept to taunt the police. Mr Dickson was found to be high in psychopathy and narcissism (sense of grandeur) which are personality types that seem to correlate with this token behaviour."

Fourth likelihood

Defence: "However, Samantha and Liam were lovers. She had stayed at his house. Is it not true that there are a million less sinister reasons why a tooth could have been found?"

Dr Simon: "That is true. A tooth may have fallen out at some other occasion."

Fifth likelihood

Prosecution: "I would now like to call Kevin Lennon (Mr Liam Dickson's Friend) to the witness stand. Is it true that Mr Liam Dickson confided in you about Ms Rollo's death?"

Kevin: "Yes. He told me he loved her. He said that she told him she wanted to end the affair. He got angry and hit her. She didn't get up. He said he was scared. So he melted the body in acid and got rid of the sludge left."

Sixth likelihood ☐

Defence: "Is it not true you were also charged with the victim's murder? And the charges were dropped once this evidence came to light?"

Kevin: "I was wrongly charged and I do not want to discuss that."

Seventh likelihood ☐

Prosecution: "I would like to call Mr Liam Dickson to give testimony… Liam did you murder Samantha Rollo?"

Liam: "No. Of course not. She wanted to end our fling. She told me by phone. I told her to leave me alone. She hung up. I stayed at home"

Prosecution: "Can anyone support this?"

Liam: "No! I was home alone."

Eighth likelihood ☐

Defence: "There is no real evidence suggesting that Samantha was at Liam's home on the night of her disappearance. CCTV even shows her on her normal bus which headed homewards, and she got off at a stop that was neither near Liam's or near her home."

Ninth likelihood ☐

Prosecution: "In summary, this trial has shown Liam to be a psychopath who killed Samantha in cold blood. He then meticulously melted the body and removed all evidence. He kept one tooth as a reminder of his victim. He is a cold, calculated killer and justice needs to be served today."

Tenth likelihood ☐

Defence: "The evidence does not add up. There is no evidence that Samantha was at Liam's apartment at all. The evidence from Mr Kevin Lennon seems to miraculously place Liam as the suspect and clear his own name from any wrong doing. Additionally, the tooth is circumstantial. This could have ended up in the apartment for a number of reasons. The real justice would be to let an innocent man walk free."

Eleventh likelihood ☐

Final Verdict:………………………

Vignette 8

Samantha Rollo (aged 22) went missing on 22nd of July 2015. She was last seen leaving her work (at the royal infirmary; she was a nurse) at 7:00pm. She never arrived home that night. She was reported missing soon after by her husband. The police reported her as dead not long after her disappearance. Her body has not been found. However, one tooth was found, which strongly suggests that she was murdered. No cause of death is known. The suspect is Liam Dickson (aged 28. He is currently working as a surgeon at the Royal infirmary.

Prosecution asks Ellen Smith, an eyewitness and colleague: "Is it true that Liam Dickson and Samantha Rollo were having an affair? And where was Samantha after work?"

Ellen: "Yeah. I had caught them once in the on-call room. They both tried to keep it a secret as they were both married. She had told me that she was going to see Liam and that she was going to end it with him and that she loved her husband."

Prosecution: "So the last person Samantha saw would have be Liam?"

Ellen: "Yeah, I think so".

First Verdict

Defence: "Is it not true that Samantha did later tell you that she had chosen to tell Liam by text that it was over?"

Ellen: "Yeah. That is correct. She did end up texting him that she wanted to end the affair. She then rang him at lunch to tell him it was over."

Defence: "Do you think this caused Samantha to go home after work then? Rather than to Liam's?"

Ellen: "It is possible. I guess there would be no reason to see him after the phone call."

Second Verdict

Prosecution: "A tooth that belonged to Ms Rollo was found in Mr Liam Dickson's apartment. An expert witness, a forensic psychologist Dr Simon Cooke, will now discuss further."

Dr Simon: "It is common in cases where individuals have murdered someone for the killer to keep a little token. The suspect may have seen the tooth as a trophy and kept it to remember his victim. The tooth may also have been kept to taunt the police. Mr Dickson was found to be high in psychopathy and narcissism (sense of grandeur) which are personality types that seem to correlate with this token behaviour."

Third Verdict

Defence: "However, Samantha and Liam were lovers. She had stayed at his house. Is it not true that there are a million less sinister reasons why a tooth could have been found?"

Dr Simon: "That is true. A tooth may have fallen out at some other occasion."

Fourth Verdict

Prosecution: "I would now like to call Kevin Lennon (Mr Liam Dickson's Friend) to the witness stand. Is it true that Mr Liam Dickson confided in you about Ms Rollo's death?"

Kevin: "Yes. He told me he loved her. He said that she told him she wanted to end the affair. He got angry and hit her. She didn't get up. He said he was scared. So he melted the body in acid and got rid of the sludge left."

Fifth Verdict

Defence: "Is it not true you were also charged with the victim's murder? And the charges were dropped once this evidence came to light?"

Kevin: "I was wrongly charged and I do not want to discuss that."

Sixth Verdict

Prosecution: "I would like to call Mr Liam Dickson to give testimony… Liam did you murder Samantha Rollo?"

Liam: "No. Of course not. She wanted to end our fling. She told me by phone. I told her to leave me alone. She hung up. I stayed at home"

Prosecution: "Can anyone support this?"

Liam: "No! I was home alone."

Seventh Verdict

Defence: "There is no real evidence suggesting that Samantha was at Liam's home on the night of her disappearance. CCTV even shows her on her normal bus which headed homewards, and she got off at a stop that was neither near Liam's or near her home."

Eighth Verdict

Prosecution: "In summary, this trial has shown Liam to be a psychopath who killed Samantha in cold blood. He then meticulously melted the body and removed all evidence. He kept one tooth as a reminder of his victim. He is a cold, calculated killer and justice needs to be served today."

Ninth Verdict

Defence: "The evidence does not add up. There is no evidence that Samantha was at Liam's apartment at all. The evidence from Mr Kevin Lennon seems to miraculously place Liam as the suspect and clear his own name from any wrong doing. Additionally, the tooth is circumstantial. This could have ended up in the apartment for a number of reasons. The real justice would be to let an innocent man walk free."

Tenth Verdict

Vignette 9

Kylie McGregor (aged 19) was found beneath the balcony of her flat on the 4th of December 2015. This was reported at 11pm at night. Her flat is near Leith docks. Kylie is a student studying business. Cause of death is believed to be from the fall. The fall fractured two ribs, snapped her neck, and caused fatal head trauma. There was also bruises on her neck, wrists and ankles. This also suggest she may have been forced over the balcony. She also had cuts and bruises across her face further suggesting a fight had occurred. The suspect of this crime is Shaun Campbell (aged 20). He is also studying business.

Evidence

Starting Point [ ]

Prosecution asks Jessica Binnie, an eyewitness: "Is it true that Kylie and Shaun got into an argument at a party that occurred at her flat?"

Jessica: "Yeah. They were arguing. Kylie was pregnant with Shaun's child. He did not want the child. They started arguing. Shaun punched her in the stomach and hit her. He shouted, 'I'll kill you before you ruin my life with this baby.' "

Second likelihood [ ]

Defence: "Did you see Shaun push Kylie over the balcony?"

Jessica: "No, I never. I saw them fight. Then, Shaun left the party and we attended to Kylie."

Defence: "Did Shaun come back when you were there?"

Jessica: "No!"

Third likelihood [ ]

Prosecution: "Blood from the suspect was found on the victim. Dr Fredrick Pearson, a forensic scientist, will now discuss the biological evidence."

Dr Fredrick: "Blood from the suspect was found on the victim. The victim also had DNA samples that matched with Shaun. The suspect was also found with blood samples in his clothing. There is a 1 in 400,000 chance that the combined biological evidence could have belonged to anyone other than the suspect."

Fourth likelihood [ ]

Defence: "Is it not true, however, that the DNA and blood transfers could have been passed onto one another during the fight?"

Dr Fredrick: "Yes."

Defence: "So you would agree that the biological evidence highlights that a fight took place, but it does not show that my client murdered Kylie?"

Dr Fredrick: "Yes, that is correct. The evidence highlights that Shaun fought with Kylie, but it does not necessarily mean that he murdered her."

Fifth likelihood [ ]

Prosecution: "I would now like to call Gary Hall (Mr Shaun Campbell's friend) to the witness stand. Is it true that Mr Shaun Campbell confided in you about Ms McGregor's death?"

Gary: "Yes. He told me after the event that he couldn't handle having a kid. He thought a kid would ruin his career. So he felt he had to get rid of the baby."

Sixth likelihood [ ]

Defence: "Did he kill Kylie?"

Gary: "He told me that he never killed Kylie. He admitted he tried to get rid of the baby. But, he told me he never went back to the flat and greatly regretted hurting Kylie."

Defence: "So he never killed Kylie?"

Gary: "No!"

Seventh likelihood [ ]

Prosecution:" I would like to call Mr Shaun Campbell to give testimony… Shaun did you murder Kylie McGregor?"

Shaun: "No. Of course not. I admitted assaulting her. I was angry. I went home though. I hated what I done to her. I loved her."

Prosecution: "Can anyone support that you stayed home after this?"

Shaun: "No! I was home alone."

Eighth likelihood [ ]

Defence: "There is no evidence suggesting that Shaun returned to Kylie's flat. No eyewitnesses, no biological evidence and no CCTV. Therefore, it is possible that after the fight Kylie was hurt. She was scared of being a single mother, she felt alone. Filled with drugs and alcohol. She may not have been pushed, she may have jumped. Is this likely?"

Shaun: "She did have antidepressants; and had been an anxious and depressed person since I had known her."

Ninth likelihood [ ]

Prosecution: "In summary, this trial has shown Shaun to be an angry man, who hit Kylie to prevent her from having his child. This was not enough though. You have heard how Shaun then murdered his girlfriend. Eyewitnesses and biological evidence highlight his guilt."

Tenth likelihood [ ]

Defence: "The evidence does not add up. Yes, there is evidence that a fight took place. There is no evidence, however, that Shaun killed Kylie. No evidence places Shaun to the murder scene after the fight took place. Similarly, no evidence that Shaun pushed Kylie over the balcony. Shaun is not guilty of murder."

Eleventh likelihood [ ]

Final Verdict:…………………………

Vignette 9

Kylie McGregor (aged 19) was found beneath the balcony of her flat on the 4th of December 2015. This was reported at 11pm at night. Her flat is near Leith docks. Kylie is a student studying business. Cause of death is believed to be from the fall. The fall fractured two ribs, snapped her neck, and caused fatal head trauma. There was also bruises on her neck, wrists and ankles. This also suggest she may have been forced over the balcony. She also had cuts and bruises across her face further suggesting a fight had occurred. The suspect of this crime is Shaun Campbell (aged 20). He is also studying business.

Prosecution asks Jessica Binnie, an eyewitness: "Is it true that Kylie and Shaun got into an argument at a party that occurred at her flat?"

Jessica: "Yeah. They were arguing. Kylie was pregnant with Shaun's child. He did not want the child. They started arguing. Shaun punched her in the stomach and hit her. He shouted, 'I'll kill you before you ruin my life with this baby.' "

First Verdict

Defence: "Did you see Shaun push Kylie over the balcony?"

Jessica: "No, I never. I saw them fight. Then, Shaun left the party and we attended to Kylie."

Defence: "Did Shaun come back when you were there?"

Jessica: "No!"

Second Verdict

Prosecution: "Blood from the suspect was found on the victim. Dr Fredrick Pearson, a forensic scientist, will now discuss the biological evidence."

Dr Fredrick: "Blood from the suspect was found on the victim. The victim also had DNA samples that matched with Shaun. The suspect was also found with blood samples in his clothing. There is a 1 in 400,000 chance that the combined biological evidence could have belonged to anyone other than the suspect."

Third Verdict

Defence: "Is it not true, however, that the DNA and blood transfers could have been passed onto one another during the fight?"

Dr Fredrick: "Yes."

Defence: "So you would agree that the biological evidence highlights that a fight took place, but it does not show that my client murdered Kylie?"

Dr Fredrick: "Yes, that is correct. The evidence highlights that Shaun fought with Kylie, but it does not necessarily mean that he murdered her."

Fourth Verdict

Prosecution: "I would now like to call Gary Hall (Mr Shaun Campbell's friend) to the witness stand. Is it true that Mr Shaun Campbell confided in you about Ms McGregor's death?"

Gary: "Yes. He told me after the event that he couldn't handle having a kid. He thought a kid would ruin his career. So he felt he had to get rid of the baby."

Fifth Verdict

Defence: "Did he kill Kylie?"

Gary: "He told me that he never killed Kylie. He admitted he tried to get rid of the baby. But, he told me he never went back to the flat and greatly regretted hurting Kylie."

Defence: "So he never killed Kylie?"

Gary: "No!"

Sixth Verdict ☐

Prosecution:" I would like to call Mr Shaun Campbell to give testimony… Shaun did you murder Kylie McGregor?"

Shaun: "No. Of course not. I admitted assaulting her. I was angry. I went home though. I hated what I done to her. I loved her."

Prosecution: "Can anyone support that you stayed home after this?"

Shaun: "No! I was home alone."

Seventh Verdict ☐

Defence: "There is no evidence suggesting that Shaun returned to Kylie's flat. No eyewitnesses, no biological evidence and no CCTV. Therefore, it is possible that after the fight Kylie was hurt. She was scared of being a single mother, she felt alone. Filled with drugs and alcohol. She may not have been pushed, she may have jumped. Is this likely?"

Shaun: "She did have antidepressants; and had been an anxious and depressed person since I had known her."

Eighth Verdict ☐

Prosecution: "In summary, this trial has shown Shaun to be an angry man, who hit Kylie to prevent her from having his child. This was not enough though. You have heard how Shaun then murdered his girlfriend. Eyewitnesses and biological evidence highlight his guilt."

Ninth Verdict ☐

Defence: "The evidence does not add up. Yes, there is evidence that a fight took place. There is no evidence, however, that Shaun killed Kylie. No evidence places Shaun to the murder scene after the fight took place. Similarly, no evidence that Shaun pushed Kylie over the balcony. Shaun is not guilty of murder."

Tenth Verdict ☐

Information sheet, Consent form and Debrief for Quasi-Experiment Two

<u>Information sheet</u>

My name is Lee Curley, and I am a Postgraduate student from the School of Life, Sport & Social Sciences at Edinburgh Napier University. The title of my project is: **"Is the Jury Still Out? The Decision Making Strategies of Jurors**".

This study will explore how jurors make decisions, and evidence interpretation. The findings of the project will be useful in a forensic and legal setting.

I am looking for volunteers to participate in the project. I am looking for *around* 120 participants in my project. The only exclusion and inclusion criteria relate to you being able to participate in a real life jury duty:

- Are you between the ages of 18-65?

- Are you on the electoral role?

- And, are you a British/Scottish national, or do you have a British visa?

If you agree to participate in the study, there will be a set procedure you will have to go through. Firstly, you will be given a legal questionnaire to fill out. Then you will be shown a homicide trial. This will be read out by the researcher. As well as making a verdict on the trials, you will also be asked to rate the individual pieces of evidence in regards to a likelihood value and an evidence strength value. How long the experiment lasts will vary between participants, there is no set limit. The average time should be approximately **45 minutes.**

All data will be anonymised (un-identifiable) as much as possible. Your name will be replaced with a participant number, *i.e. participant 1*, and it will not be possible for you to be identified in any reporting of the data gathered. All data collected will be kept in a secure place (e.g. stored on a pc that is password protected) **to which only the researcher will have access**. You have right to withdraw at anytime. The data will be kept till the research is published, following which all data that could identify you will be destroyed. Likewise, the data will be presented at conferences.

If you have any further questions, you are welcome to contact me, or my director of studies:

Lee Curley (BSc Hons)	Dr Rory Maclean
School of Life, Sport & Social Sciences	School of Life, Sport & Social Sciences
Edinburgh Napier University	Edinburgh Napier University
Sighthill Campus	Sighthill Campus
Sighthill Court	Sighthill Court
Edinburgh EH11 4BN	Edinburgh EH11 4BN
Email: 10004435@live.napier.ac.uk	Email: r.maclean@napier.ac.uk
Tel: (0131) 5716	Tel: (0131) 455 6148

If you would like to contact an independent person, who knows about this project but is not involved in it, you are welcome to contact Alex McIntyre; who is my independent advisor. Her contact details are given below:

Dr Alex McIntyre: Lecturer;

Faculty of Health, Life & Social Sciences; Edinburgh Napier University

Sighthill Campus,

Sighthill Court,

Edinburgh EH11 4BN,

Email: A.McIntyre@Napier.ac.uk).

If you have:

- Read and understood this information sheet,

- All questions you had have now been answered,

- And you would now like to be a participant in the study,

Then please now see the consent form.

"**Is the Jury Still Out? The Decision Making Strategies of Jurors .**"

Consent form

I have **read and understood** the information sheet and this consent form. I have had an **opportunity to ask questions** about my participation.

I understand that I am under **no obligation** to take part in this study.

I **understand** that I have the right to **withdraw** from this study at any stage without giving any reason.

I agree to participate in this study.

Name of participant: _____

Signature of participant: _____

Signature of researcher: _____

Date: _____

Contact details of the researcher:

Name of researcher: Lee Curley (Bsc Hons)

Address: PhD, Psychology,

School of Life, Sport & Social Sciences,

Edinburgh Napier University,

Sighthill Campus, Sighthill Court,

Edinburgh, EH11 4BN,

Room number: 2.B.46.

Email: 10004435@live.napier.ac.uk

Tel: (0131) 5716

Debrief

The true aims of this research relate to how jurors make decisions. The information you have just given me will allow me to find out what variables relate to the point when someone makes a decision, and how this point may affect how you interpret evidence. Specifically though, this research aims to focus on how the reaching of threshold (i.e. making a decision before all the evidence has been shown) may cause evidence distortion. The implications for this research may be great in regards to juror decision making, and I therefore appreciate the help that you have given me.

Thanks for your participation throughout this experiment. Although, you can still withdraw your data if you want, and do not have to give a reason why.

Please tick here if you want your data to be used

If you suffer any distress from participating in this experiment please contact the Samaritans at: jo@samaritans.org.

Finally, if you wish to contact someone independent, you can contact Dr Alex McIntyre- previously mentioned- at: email: A.McIntyre@Napier.ac.uk.

Do you have any questions regarding the experiment or my research? Please do not hesitate to ask.

Thanks again for all your help.

If you have any further questions, you are welcome to contact me, or my director of studies:

Lee Curley (BSc Hons)	Dr Rory Maclean
School of Life, Sport & Social Sciences	School of Life, Sport & Social Sciences
Edinburgh Napier University	Edinburgh Napier University
Sighthill Campus	Sighthill Campus
Sighthill Court	Sighthill Court
Edinburgh EH11 4BN	Edinburgh EH11 4BN
Email: 10004435@live.napier.ac.uk	Email: r.maclean@napier.ac.uk
Tel: (0131) 5716	Tel: (0131) 455 6148

Poster for Quasi-Experiment Two

Edinburgh Napier
UNIVERSITY

Is the Jury Still Out?
The Decision Making Strategies of Jurors.

The study aims to: look at the decision making strategies of

jurors. In order to be a participant you need to:

- Be **eligible** to vote.

- Not have been **imprisoned** in the last **7 years** for any longer than **three months.**

- Not have been sentenced with **community service** in the last **5 years.**

- And be a **Scottish/British national** or have a **British visa.**

Participants required for a legal psychology experiment

Sessions take place at the Sighthill campus of Edinburgh Napier University, and will last approximately **45 minutes.**

Each participant will complete **one** short decision making task, **which focuses on a murder trial.**

If you are **interested** in taking part in this study or would like **more information** please contact:

Lee Curley (psychology PhD student)
Email: 10004435@live.napier.ac.uk.

12. Appendix D

Quasi-Experiment Three Materials

Pilot Study

Please answer all the questions provided **in full**, <u>questions that are not answered in full will not be used</u>. This questionnaire will provide statements, please rank these statements in order of how much they relate to you. Also, if you do not understand the terms, please ask the researcher. **Please circle (or underline) your chosen response for each statement/question.**

1) How accurate do you think DNA evidence is?

81-100%   61-80%   41-60%   21-40%   0-20%

2) Eyewitness testimony would not allow me to reach an accurate .decision.

Strongly   Agree   Do not   Disagree   Strongly

Agree   know   Disagree

3) I would weight a secondary confession (when a suspect confesses .to an individual who then informs the police) weakly when making a .decision as a juror.

Strongly   Agree   Do not   Disagree   Strongly

Agree   know   Disagree

4) I view expert testimony (from a psychologist) as being very strong.

Strongly   Agree   Do not   Disagree   Strongly

Agree   know   Disagree

5) I view eyewitness testimony as being very robust.

Strongly   Agree   Do not   Disagree   Strongly

Agree   know   Disagree

6) How accurate do you think expert testimony (from a psychologist) .is?

81-100%   61-80%   41-60%   21-40%   0-20%

7) I view DNA evidence as lacking robustness. Please circle the one.

Strongly   Agree   Do not   Disagree   Strongly

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Agree   know   Disagree

8) I would weight eyewitness testimony strongly when making a .decision as a juror.

Strongly   Agree   Do not   Disagree   Strongly

Agree   know   Disagree

9) ….Expert testimony (from a psychologist) would not allow me to .reach an accurate decision.

Strongly   Agree   Do not   Disagree   Strongly

Agree   know   Disagree

10) I view a secondary confession as being very robust.

Strongly   Agree   Do not   Disagree   Strongly

Agree   know   Disagree

11) I view DNA evidence as being very strong.

Strongly   Agree   Do not   Disagree   Strongly

Agree   know   Disagree

12) How accurate do you think eyewitness testimony is?

81-100%   61-80%   41-60%   21-40%   0-20%

13) A secondary Confession would allow me to reach an accurate decision?

Strongly   Agree   Do not   Disagree   Strongly

Agree   know   Disagree

14) I view expert testimony (from a psychologist) as being very robust.

Strongly   Agree   .Do not   Disagree   Strongly

Agree   know   Disagree

15) How accurate do you think a secondary confession is?

81-100%   61-80%   41-60%   21-40%   0-20%

16) I would weight DNA evidence strongly when making a decision as a juror.

Strongly   Agree   Do not   Disagree   Strongly

Agree   know   Disagree

17) I view eyewitness testimony as being very weak.

Strongly   Agree   .Do not   Disagree   Strongly

Agree   know   Disagree

18) I would weight expert testimony (from a psychologist) strongly when making a decision as a juror.

Strongly   Agree   Do not   Disagree   Strongly

Agree   know   Disagree

19) DNA evidence would allow me to reach an accurate decision?

Strongly   Agree   Do not   Disagree   Strongly

Agree   know   Disagree

20) I view a secondary confession as being very strong.

Strongly   Agree   Do not   Disagree   Strongly

Agree   know   Disagree

21) Finally, please rate the following pieces of evidence from strongest (four) to weakest (one). Please rate all the pieces of evidence from strongest (4), second strongest (3), third strongest (2) and weakest (1) in the boxes provided:

    I.   **DNA evidence**

   II.   **Eyewitness testimony**

  III.   **Secondary Confession**

  IV.   **Expert witness**

PJAQ

Legal Questionnaire

This questionnaire will provide statements, please rank these statements in order of how much they relate to you:

Strongly Disagree	Disagree	Do not know	Agree	Strongly Agree
1	**2**	**3**	**4**	**5**

With this scoring system in mind please rate the following statements, by circling the most appropriate number from 1 to 5 in the **response column**. Please answer **all** the questions, **questions that have not been answered will not be used.**

Questions/statements (Please Read carefully and answer honestly)	Circle Appropriate Response (Use the scale above)
1. If a suspect runs from police, then he probably committed the crime.	1 2 3 4 5
2. A defendant should be found guilty if a majority of 8 out of 15 jurors (in Scotland), or a unanimous decision of 8 out of 12 (in England and Wales), vote guilty.	1 2 3 4 5
3. Too often jurors hesitate to convict someone who is guilty out of pure sympathy.	1 2 3 4 5
4. In most cases where the accused presents a strong defense, it is only because of a good lawyer.	1 2 3 4 5
5. Out of every 100 people brought to trial, at least 75 are guilty of the crime with which they are charged.	1 2 3 4 5
6. For serious crimes like murder, a defendant should be found guilty so long as there is a 90% chance that he committed the crime.	1 2 3 4 5
7. Defense lawyers don't really care about guilt or innocence; they are just in business to make money.	1 2 3 4 5
8. Generally, the police make an arrest only when they are sure about who committed the crime.	1 2 3 4 5
9. Many accident claims filed against insurance companies are phony.	1 2 3 4 5
10. The defendant is often a victim of his own bad reputation.	1 2 3 4 5

11. Extenuating circumstances should not be considered; if a person commits a crime, then that person should be punished.	1	2	3	4	5
12. If the defendant committed a victimless crime, like possession of marijuana, he should never be convicted.	1	2	3	4	5
13. Defense lawyers are too willing to defend individuals they know are guilty.	1	2	3	4	5
14. Police routinely lie to protect other police officers.	1	2	3	4	5
15. Once a criminal, always a criminal.	1	2	3	4	5
16. Lawyers will do whatever it takes, even lie, to win a case.	1	2	3	4	5
17. Criminals should be caught and convicted by "any means necessary."	1	2	3	4	5
18. A prior record of conviction is the best indicator of a person's guilt in the present case.	1	2	3	4	5
19. Rich individuals are almost never convicted of their crimes.	1	2	3	4	5
20. If a defendant is a member of a gang, he/she is definitely guilty of the crime.	1	2	3	4	5
21. Minorities use the "race issue" only when they are guilty.	1	2	3	4	5
22. When it is the suspect's word against the police officer's, I believe the police.	1	2	3	4	5
23. Men are more likely to be guilty of crimes than women.	1	2	3	4	5
24. The large number of black individuals currently in prison is an example of the innate criminality of that subgroup.	1	2	3	4	5
25. A Black man on trial with a predominantly White jury will always be found guilty.	1	2	3	4	5

26. If a witness refuses to take a lie detector test, it is because he/she is hiding something.	1 2 3 4 5
27. Minority suspects are likely to be guilty, more often than not.	1 2 3 4 5
28. Defendants who change their story are almost always guilty.	1 2 3 4 5
29. Famous people are often considered to be "above the law."	1 2 3 4 5

Quasi-Experiment Materials

Vignette one original

Vignette one

Opening statement

On the 28th of January, 2016, at approximately 2:00am, Amanda Hamilton (aged 22) was found dead in her house by her flatmate Rebecca Grandison. It is estimated that she may have died between the hours of 22:00 pm and 1:00 am. It is thought that the cause of her death was asphyxiation. She was found with lacerations around her neck; as well as evidence of choking. Amanda also suffered from a broken wrist, a fractured jaw and scratches on her shoulder, which may have hinted that she had tried to fight back against her murderer. Rebecca was currently completing her Masters in Psychology. The defendant who has been charged for her murder is Graeme Ralph, he was Amanda's Boyfriend (aged 24) and is currently a PhD student studying forensic psychology.

Evidence

First chunk

Prosecution

Eyewitness

Prosecution: I would like to call Sandra Clooney to the witness stand. Sandra, is it true that you saw Graeme Ralph leaving Amanda's flat at 24:00?

Sandra: Yes, I live across the landing from Amanda and Rebecca. I knew them well, and I had been to several parties with them. The day she died I was up late as I could not sleep. So I was smoking out of the window. When I looked outside, I saw Graeme rushing off at 24:00. This wasn't normal of him as he usually stayed at Amanda's.

Defence: Sandra, is it not true that the police seized your house that night and found that you were under the influence of alcohol and marijuana? And, you, therefore, cannot be 100% sure that you saw Graeme Ralph leaving your building block?

Sandra: Yes, that is true I had been drinking. I guess it may have been someone else.

Prosecution second chunk

Expert Testimony

Prosecution: I will now call expert witness Dr Sigmund Skinner who specialises in criminal personality traits and decision making strategies.

Dr Skinner: Based on several questionnaires, observations and interviews it seems that Graeme has psychopathic tendencies and is quite impulsive. During the interviews and observations he showed signs of anger, and on occasions exploded with frustration. My personal opinion is that he is a hostile individual who tried to control Amanda. Amanda's resistance may have caused him to act impulsively, which may have led to Amanda's death.

Defence: However, is it not true Dr Skinner that Graeme has no record of violent assault or aggressive tendencies? Would this not make it less likely for Graeme to have murdered Amanda?

Dr Skinner: Yes, you are right. My research has highlighted that there is a positive association between the frequency of domestic abuse attacks and the likelihood of murder. Therefore, it could be said that because Graeme has no prior convictions for domestic abuse it may be unlikely that he committed the murder.

Prosecution Chunk 3

Prosecution: I would now like to call Forensic biologist Dr Charles Mendel. Is it true that Graeme Ralphs DNA was found on Amanda Hamilton?

Dr Charles Mendel: Yes, Graeme's DNA was found on Amanda's neck, and Amanda's DNA was found on Graeme's clothes and under his fingernails. The combined biological evidence suggested that the likelihood of someone else transferring DNA to both Amanda and Graeme is about one in 16 million.

Defence: However, Dr Mendel, Amanda and Graeme were a couple. Surely it makes sense that DNA from one of them would be found on the other person in the couple, and vice versa?

Dr Charles Mendel: Yeah you are correct. DNA can be transferred very easily. The DNA does show that Amanda and Graeme had contact the day of Amanda's murder. However, it does not mean that Graeme physically harmed Amanda.

Prosecution Chunk 4

Prosecution: I would like to call Graeme Ralphs friend Alex Kirkwood to the stand. Alex, did Graeme confess to you about the murder he committed on the 28th of January 2016?

Alex Kirkwood: Yeah, he had been saying for weeks before it that Amanda was moving to Australia after her masters. He kept saying that he wasn't going to let that happen. He would do anything to stop her leaving. He said, that on the night she died they got into an argument over her leaving. He said that he grabbed her, she slapped him. Then he hit her back and grabbed her neck, and she tried to fight him off and before he knew it she was dead. He had told me because he said that his guilt had become too strong.

Defence: Is it not true that you and Graeme had recently had a fight? He had sent you to hospital as he had caught you messaging and fliting with Amanda?

Alex Kirkwood: Yeah, that is true, I had been messaging Amanda for a while. When he found out he beat me up, my girlfriend found out also and left me, and all of me and Graeme's friends took his side. He left me with nothing, I think that prison would be the perfect place for a spiteful man like Graeme.

Closing Statements

Prosecution: The eyewitness testimony places Graeme to the scene of the crime. The biological evidence attaches Graeme to the victim. The expert testimony from Dr Sigmund Skinner showed that the suspect had a volatile and impulsive nature, and the confession highlighted how Graeme Ralph murdered Amanda Hamilton. Graeme Ralph is guilty of homicide, and should be convicted.

Defence: The eyewitness testimony could be wrong as the witness was intoxicated and high, and the DNA evidence only showed contact, not murder. Dr Sigmund Skinner admitted that because Graeme had no prior convictions for domestic abuse that it may be unlikely that Graeme committed murder, and the confession was fabricated as a revenge plot by a sadistic ex-friend of Graeme. Graeme is innocent.

Judge: Remember to give a guilty verdict you must think that the suspect was guilty beyond reasonable doubt.

Vignette two original

Vignette Two

Opening statement

On the 9th of March, 2016, at approximately 3:00am, Jennifer Ramsay (aged 23) was found dead in her house by her friend Cara Luby. It is estimated that she may have died between the hours of 23:00 pm and 2:00 am. It is thought that the cause of death was through severe head trauma. She was found with a crack in her skull, a broken nose; as well as a fractured Jaw. Jennifer also suffered from a broken thumb, lacerations on her wrist and scratches on her neck and face. Jennifer was currently working as a care worker, and supported individuals with violent tendencies. The defendant who has been charged for her murder is Paul McGinn (aged 25), he was Jennifer's fiancé', and is currently working as an insurance salesman.

Evidence

First chunk

Prosecution

Eyewitness

Prosecution: I would like to call Kirstie Lawson to the witness stand. Kirstie, is it true that you saw Paul McGinn hovering around Jennifer's house at 1:00?

Kirstie: Yes, I live across the road from Jennifer. I knew her well, and I had been to several parties with her. The day she died I was walking home, and just before I arrived home, I saw Paul standing outside her house. He was acting kind of erratically. He was acting very odd.

Defence: Is it not true that you had been out drinking that night and had lost you glasses? Therefore, you cannot be sure that it was Paul who you saw?

Kirstie: Yes, that is true, I had been drinking. I guess it may have been someone else.

Prosecution second chunk

Expert Testimony

Prosecution: I will now call expert witness Dr Burrhus Freud to the witness stand. Dr Freud is an expert in psychopathy and dark personality traits.

Dr Burrhus Freud: Paul McGinn was observed, interviewed and completed several inventories. It was found that he displayed psychopathic traits, narcissistic behaviour (i.e. a sense of grandeur), and a low moral compass. These traits have been found, in my previous research, to have a forecasting ability over violent tendencies and murder.

Defence: Is it not true though that your research only found these results in one study, and has not been repeated in other investigations. Therefore, in layperson terms, the traits you have found in Paul McGinn may not point to murder?

Dr Burrhus Freud: Yeah, you are correct. My research has had reliability and validity issues. Therefore, there is no guarantee that the traits measured imply murder. Also, the traits measured in Paul McGinn are commonly found to be high in salesman. So he may be high on psychopathy, narcissism and have a low moral compass because he is a salesman rather than a murderer.

Prosecution Chunk 3

Prosecution: I would now like to call Forensic biologist Dr Watson Crick. Dr Crick, can you tell us about the biological evidence found during the investigation?

Dr Crick: A smashed pitcher was found next to the victim, which contained the blood of Jennifer Ramsay and had traces of Paul McGinn's DNA. This suggests that the pitcher was the murder weapon. The DNA evidence proposes that there is a one in 10 million chance of the DNA found belonging to someone else other than Paul McGinn.

Defence: However, is it not true that unidentified DNA was also found on the pitcher? Also, a pitcher is a commonly used household object, so surely, it is not really a strange finding that Jennifer's Fiancé's DNA would be found on the pitcher?

Dr Crick: Yes, this is true, a trace of unidentified DNA was found on the pitcher. This finding is disconcerting. Also, DNA evidence can be transferred easily, and it would make sense that Jennifer's Fiancé' may have used the pitcher for drinking juice.

Prosecution Chunk 4

Prosecution: I would like to call Paul McGinn's friend Stuart Brett to the stand. Stuart, did Paul confess to you about the murder he committed on the 9th of March 2016?

Stuart Brett: Yes, she had apparently been having an affair with our friend David Fullerton. David had been messaging Jennifer inappropriately for a while, he had also had met up with her for sexual intercourse on several occasions. Paul told me that he had found out about this, he confronted her, she threatened to end the engagement and to start dating Mr Fullerton. Paul told me this made him angry, and that they got into a fight, and both of them started hitting one another. Then, to end the fight Paul, apparently, grabbed the pitcher and slammed it against Jennifer's skull.

Defence: However, is it not true that you had also been charged with Jennifer's murder previously? And, that this evidence only came to light after the charges were dropped?

Stuart Brett: Yes, I was charged, but those charges were dropped. I do not care for your insinuation that I am trying to frame Paul.

Closing Statements

Prosecution: The eyewitness testimony places Paul to the scene of the crime. The biological evidence attaches Paul to the murder weapon. The expert testimony from Dr Freud showed that the suspect had traits associated with psychopathy and had a low moral compass, which have been shown to be predictive factors in relation to murder. The confession produced the narrative of how Paul murdered Jennifer. Paul McGinn is guilty of homicide.

Defence: The eyewitness testimony could be inaccurate as the witness was intoxicated and did not have her glasses, and the DNA evidence only proves that Paul may have used a pitcher to drink juice, not to murder his Fiancé'. Dr Freud's research lacked scientific rigour, which nullifies the implications of the personality traits found within Paul. The confession was fabricated by an ex-friend of Paul to escape the judicial system. Paul is innocent.

Judge: Remember to give a guilty verdict you must think that the suspect was guilty beyond reasonable doubt.

Vignette one (strong anchor counterbalance 2)

Opening statement

On the 28th of January, 2016, at approximately 2:00am, Amanda Hamilton (aged 22) was found dead in her house by her flatmate Rebecca Grandison. It is estimated that she may have died between the hours of 22:00 pm and 1:00 am. It is thought that the cause of her death was asphyxiation. She was found with lacerations around her neck; as well as evidence of choking. Amanda also suffered from a broken wrist, a fractured jaw and scratches on her shoulder, which may have hinted that she had tried to fight back against her murderer. Rebecca was currently completing her Masters in Psychology. The defendant who has been charged for her murder is Graeme Ralph, he was Amanda's Boyfriend (aged 24) and is currently a PhD student studying forensic psychology.

Evidence

Prosecution: I would now like to call Forensic biologist Dr Charles Mendel. Is it true that Graeme Ralphs DNA was found on Amanda Hamilton?

Dr Charles Mendel: Yes, Graeme's DNA was found on Amanda's neck, and Amanda's DNA was found on Graeme's clothes and under his fingernails. The combined biological evidence suggested that the likelihood of someone else transferring DNA to both Amanda and Graeme is about one in 16 million.

Defence: However, Dr Mendel, Amanda and Graeme were a couple. Surely it makes sense that DNA from one of them would be found on the other person in the couple, and vice versa?

Dr Charles Mendel: Yeah you are correct. DNA can be transferred very easily. The DNA does show that Amanda and Graeme had contact the day of Amanda's murder. However, it does not mean that Graeme physically harmed Amanda.

Prosecution: I will now call expert witness Dr Sigmund Skinner who specialises in criminal personality traits and decision making strategies.

Dr Skinner: Based on several questionnaires, observations and interviews it seems that Graeme has psychopathic tendencies and is quite impulsive. During the interviews and observations he showed signs of anger, and on occasions exploded with frustration. My personal opinion is that he is a hostile individual who tried to control Amanda. Amanda's resistance may have caused him to act impulsively, which may have led to Amanda's death.

Defence: However, is it not true Dr Skinner that Graeme has no record of violent assault or aggressive tendencies? Would this not make it less likely for Graeme to have murdered Amanda?

Dr Skinner: Yes, you are right. My research has highlighted that there is a positive association between the frequency of domestic abuse attacks and the likelihood of murder. Therefore, it could be said that because Graeme has no prior convictions for domestic abuse it may be unlikely that he committed the murder.

Prosecution: I would like to call Sandra Clooney to the witness stand. Sandra, is it true that you saw Graeme Ralph leaving Amanda's flat at 24:00?

Sandra: Yes, I live across the landing from Amanda and Rebecca. I knew them well, and I had been to several parties with them. The day she died I was up late as I could not sleep. So I was smoking out of the window. When I looked outside, I saw Graeme rushing off at 24:00. This wasn't normal of him as he usually stayed at Amanda's.

Defence: Sandra, is it not true that the police seized your house that night and found that you were under the influence of alcohol and marijuana? And, you, therefore, cannot be 100% sure that you saw Graeme Ralph leaving your building block?

Sandra: Yes, that is true I had been drinking. I guess it may have been someone else.

Prosecution: I would like to call Graeme Ralphs friend Alex Kirkwood to the stand. Alex, did Graeme confess to you about the murder he committed on the 28th of January 2016?

Alex Kirkwood: Yeah, he had been saying for weeks before it that Amanda was moving to Australia after her masters. He kept saying that he wasn't going to let that happen. He would do anything to stop her leaving. He said, that on the night she died they got into an argument over her leaving. He said that he grabbed her, she slapped him. Then he hit her back and grabbed her neck, and she tried to fight him off and before he knew it she was dead. He had told me because he said that his guilt had become too strong.

Defence: Is it not true that you and Graeme had recently had a fight? He had sent you to hospital as he had caught you messaging and fliting with Amanda?

Alex Kirkwood: Yeah, that is true, I had been messaging Amanda for a while. When he found out he beat me up, my girlfriend found out also and left me, and all of me and Graeme's friends took his side. He left me with nothing, I think that prison would be the perfect place for a spiteful man like Graeme.

Closing Statements

Prosecution: The eyewitness testimony places Graeme to the scene of the crime. The biological evidence attaches Graeme to the victim. The expert testimony from Dr Sigmund Skinner showed that the suspect had a volatile and impulsive nature, and the confession highlighted how Graeme Ralph murdered Amanda Hamilton. Graeme Ralph is guilty of homicide, and should be convicted.

Defence: The eyewitness testimony could be wrong as the witness was intoxicated and high, and the DNA evidence only showed contact, not murder. Dr Sigmund Skinner admitted that because Graeme had no prior convictions for domestic abuse that it may be unlikely that Graeme committed murder, and the confession was fabricated as a revenge plot by a sadistic ex-friend of Graeme. Graeme is innocent.

Judge: Remember to give a guilty verdict you must think that the suspect was guilty beyond reasonable doubt.

Vignette one (weak anchor counterbalance 2)

Opening statement

On the 28th of January, 2016, at approximately 2:00am, Amanda Hamilton (aged 22) was found dead in her house by her flatmate Rebecca Grandison. It is estimated that she may have died between the hours of 22:00 pm and 1:00 am. It is thought that the cause of her death was asphyxiation. She was found with lacerations around her neck; as well as evidence of choking. Amanda also suffered from a broken wrist, a fractured jaw and scratches on her shoulder, which may have hinted that she had tried to fight back against her murderer. Rebecca was currently completing her Masters in Psychology. The defendant who has been charged for her murder is Graeme Ralph, he was Amanda's Boyfriend (aged 24) and is currently a PhD student studying forensic psychology.

Evidence

Prosecution: I would like to call Graeme Ralphs friend Alex Kirkwood to the stand. Alex, did Graeme confess to you about the murder he committed on the 28th of January 2016?

Alex Kirkwood: Yeah, he had been saying for weeks before it that Amanda was moving to Australia after her masters. He kept saying that he wasn't going to let that happen. He would do anything to stop her leaving. He said, that on the night she died they got into an argument over her leaving. He said that he grabbed her, she slapped him. Then he hit her back and grabbed her neck, and she tried to fight him off and before he knew it she was dead. He had told me because he said that his guilt had become too strong.

Defence: Is it not true that you and Graeme had recently had a fight? He had sent you to hospital as he had caught you messaging and fliting with Amanda?

Alex Kirkwood: Yeah, that is true, I had been messaging Amanda for a while. When he found out he beat me up, my girlfriend found out also and left me, and all of me and Graeme's friends took his side. He left me with nothing, I think that prison would be the perfect place for a spiteful man like Graeme.

Prosecution: I will now call expert witness Dr Sigmund Skinner who specialises in criminal personality traits and decision making strategies.

Dr Skinner: Based on several questionnaires, observations and interviews it seems that Graeme has psychopathic tendencies and is quite impulsive. During the interviews and observations he showed signs of anger, and on occasions exploded with frustration. My personal opinion is that he is a hostile individual who tried to control Amanda. Amanda's resistance may have caused him to act impulsively, which may have led to Amanda's death.

Defence: However, is it not true Dr Skinner that Graeme has no record of violent assault or aggressive tendencies? Would this not make it less likely for Graeme to have murdered Amanda?

Dr Skinner: Yes, you are right. My research has highlighted that there is a positive association between the frequency of domestic abuse attacks and the likelihood of murder. Therefore, it could be said that because Graeme has no prior convictions for domestic abuse it may be unlikely that he committed the murder.

Prosecution: I would like to call Sandra Clooney to the witness stand. Sandra, is it true that you saw Graeme Ralph leaving Amanda's flat at 24:00?

Sandra: Yes, I live across the landing from Amanda and Rebecca. I knew them well, and I had been to several parties with them. The day she died I was up late as I could not sleep. So I was smoking out of the window. When I looked outside, I saw Graeme rushing off at 24:00. This wasn't normal of him as he usually stayed at Amanda's.

Defence: Sandra, is it not true that the police seized your house that night and found that you were under the influence of alcohol and marijuana? And, you, therefore, cannot be 100% sure that you saw Graeme Ralph leaving your building block?

Sandra: Yes, that is true I had been drinking. I guess it may have been someone else.

Prosecution: I would now like to call Forensic biologist Dr Charles Mendel. Is it true that Graeme Ralphs DNA was found on Amanda Hamilton?

Dr Charles Mendel: Yes, Graeme's DNA was found on Amanda's neck, and Amanda's DNA was found on Graeme's clothes and under his fingernails. The combined biological evidence suggested that the likelihood of someone else transferring DNA to both Amanda and Graeme is about one in 16 million.

Defence: However, Dr Mendel, Amanda and Graeme were a couple. Surely it makes sense that DNA from one of them would be found on the other person in the couple, and vice versa?

Dr Charles Mendel: Yeah you are correct. DNA can be transferred very easily. The DNA does show that Amanda and Graeme had contact the day of Amanda's murder. However, it does not mean that Graeme physically harmed Amanda.

Closing Statements

Prosecution: The eyewitness testimony places Graeme to the scene of the crime. The biological evidence attaches Graeme to the victim. The expert testimony from Dr Sigmund Skinner showed that the suspect had a volatile and impulsive nature, and the confession highlighted how Graeme Ralph murdered Amanda Hamilton. Graeme Ralph is guilty of homicide, and should be convicted.

Defence: The eyewitness testimony could be wrong as the witness was intoxicated and high, and the DNA evidence only showed contact, not murder. Dr Sigmund Skinner admitted that because Graeme had no prior convictions for domestic abuse that it may be unlikely that Graeme committed murder, and the confession was fabricated as a revenge plot by a sadistic ex-friend of Graeme. Graeme is innocent.

Judge: Remember to give a guilty verdict you must think that the suspect was guilty beyond reasonable doubt.

Vignette Two (Strong counterbalance 1)

Opening statement

On the 9th of March, 2016, at approximately 3:00am, Jennifer Ramsay (aged 23) was found dead in her house by her friend Cara Luby. It is estimated that she may have died between the hours of 23:00 pm and 2:00 am. It is thought that the cause of death was through severe head trauma. She was found with a crack in her skull, a broken nose; as well as a fractured Jaw. Jennifer also suffered from a broken thumb, lacerations on her wrist and scratches on her neck and face. Jennifer was currently working as a care worker, and supported individuals with violent tendencies. The defendant who has been charged for her murder is Paul McGinn (aged 25), he was Jennifer's fiancé', and is currently working as an insurance salesman.

Evidence

Prosecution: I would now like to call Forensic biologist Dr Watson Crick. Dr Crick, can you tell us about the biological evidence found during the investigation?

Dr Crick: A smashed pitcher was found next to the victim, which contained the blood of Jennifer Ramsay and had traces of Paul McGinn's DNA. This suggests that the pitcher was the murder weapon. The DNA evidence proposes that there is a one in 10 million chance of the DNA found belonging to someone else other than Paul McGinn.

Defence: However, is it not true that unidentified DNA was also found on the pitcher? Also, a pitcher is a commonly used household object, so surely, it is not really a strange finding that Jennifer's Fiancé's DNA would be found on the pitcher?

Dr Crick: Yes, this is true, a trace of unidentified DNA was found on the pitcher. This finding is disconcerting. Also, DNA evidence can be transferred easily, and it would make sense that Jennifer's Fiancé' may have used the pitcher for drinking juice.

Prosecution: I would like to call Kirstie Lawson to the witness stand. Kirstie, is it true that you saw Paul McGinn hovering around Jennifer's house at 1:00?

Kirstie: Yes, I live across the road from Jennifer. I knew her well, and I had been to several parties with her. The day she died I was walking home, and just before I arrived home, I saw Paul standing outside her house. He was acting kind of erratically. He was acting very odd.

Defence: Is it not true that you had been out drinking that night and had lost you glasses? Therefore, you cannot be sure that it was Paul who you saw?

Kirstie: Yes, that is true, I had been drinking. I guess it may have been someone else.

Prosecution: I will now call expert witness Dr Burrhus Freud to the witness stand. Dr Freud is an expert in psychopathy and dark personality traits.

Dr Burrhus Freud: Paul McGinn was observed, interviewed and completed several inventories. It was found that he displayed psychopathic traits, narcissistic behaviour (i.e. a sense of grandeur), and a low moral compass. These traits have been found, in my previous research, to have a forecasting ability over violent tendencies and murder.

Defence: Is it not true though that your research only found these results in one study, and has not been repeated in other investigations. Therefore, in layperson terms, the traits you have found in Paul McGinn may not point to murder?

Dr Burrhus Freud: Yeah, you are correct. My research has had reliability and validity issues. Therefore, there is no guarantee that the traits measured imply murder. Also, the traits measured in Paul McGinn are commonly found to be high in salesman. So he may be high on psychopathy, narcissism and have a low moral compass because he is a salesman rather than a murderer.

Prosecution: I would like to call Paul McGinn's friend Stuart Brett to the stand. Stuart, did Paul confess to you about the murder he committed on the 9th of March 2016?

Stuart Brett: Yes, she had apparently been having an affair with our friend David Fullerton. David had been messaging Jennifer inappropriately for a while, he had also had met up with her for sexual intercourse on several occasions. Paul told me that he had found out about this, he confronted her, she threatened to end the engagement and to start dating Mr Fullerton. Paul told me this made him angry, and that they got into a fight, and both of them started hitting one another. Then, to end the fight Paul, apparently, grabbed the pitcher and slammed it against Jennifer's skull.

Defence: However, is it not true that you had also been charged with Jennifer's murder previously? And, that this evidence only came to light after the charges were dropped?

Stuart Brett: Yes, I was charged, but those charges were dropped. I do not care for your insinuation that I am trying to frame Paul.

Closing Statements

Prosecution: The eyewitness testimony places Paul to the scene of the crime. The biological evidence attaches Paul to the murder weapon. The expert testimony from Dr Freud showed that the suspect had traits associated with psychopathy and had a low moral compass, which have been shown to be predictive factors in relation to murder. The confession produced the narrative of how Paul murdered Jennifer. Paul McGinn is guilty of homicide.

Defence: The eyewitness testimony could be inaccurate as the witness was intoxicated and did not have her glasses, and the DNA evidence only proves that Paul may have used a pitcher to drink juice, not to murder his Fiancé'. Dr Freud's research lacked scientific rigour, which nullifies the implications of the personality traits found within Paul. The confession was fabricated by an ex-friend of Paul to escape the judicial system. Paul is innocent.

Judge: Remember to give a guilty verdict you must think that the suspect was guilty beyond reasonable doubt.

Vignette Two (weak anchor counterbalance 1)

Opening statement

On the 9th of March, 2016, at approximately 3:00am, Jennifer Ramsay (aged 23) was found dead in her house by her friend Cara Luby. It is estimated that she may have died between the hours of 23:00 pm and 2:00 am. It is thought that the cause of death was through severe head trauma. She was found with a crack in her skull, a broken nose; as well as a fractured Jaw. Jennifer also suffered from a broken thumb, lacerations on her wrist and scratches on her neck and face. Jennifer was currently working as a care worker, and supported individuals with violent tendencies. The defendant who has been charged for her murder is Paul McGinn (aged 25), he was Jennifer's fiancé', and is currently working as an insurance salesman.

Evidence

Prosecution: I would like to call Paul McGinn's friend Stuart Brett to the stand. Stuart, did Paul confess to you about the murder he committed on the 9th of March 2016?

Stuart Brett: Yes, she had apparently been having an affair with our friend David Fullerton. David had been messaging Jennifer inappropriately for a while, he had also had met up with her for sexual intercourse on several occasions. Paul told me that he had found out about this, he confronted her, she threatened to end the engagement and to start dating Mr Fullerton. Paul told me this made him angry, and that they got into a fight, and both of them started hitting one another. Then, to end the fight Paul, apparently, grabbed the pitcher and slammed it against Jennifer's skull.

Defence: However, is it not true that you had also been charged with Jennifer's murder previously? And, that this evidence only came to light after the charges were dropped?

Stuart Brett: Yes, I was charged, but those charges were dropped. I do not care for your insinuation that I am trying to frame Paul.

Prosecution: I would like to call Kirstie Lawson to the witness stand. Kirstie, is it true that you saw Paul McGinn hovering around Jennifer's house at 1:00?

Kirstie: Yes, I live across the road from Jennifer. I knew her well, and I had been to several parties with her. The day she died I was walking home, and just before I arrived home, I saw Paul standing outside her house. He was acting kind of erratically. He was acting very odd.

Defence: Is it not true that you had been out drinking that night and had lost you glasses? Therefore, you cannot be sure that it was Paul who you saw?

Kirstie: Yes, that is true, I had been drinking. I guess it may have been someone else.

Prosecution: I will now call expert witness Dr Burrhus Freud to the witness stand. Dr Freud is an expert in psychopathy and dark personality traits.

Dr Burrhus Freud: Paul McGinn was observed, interviewed and completed several inventories. It was found that he displayed psychopathic traits, narcissistic behaviour (i.e. a sense of grandeur), and a low moral compass. These traits have been found, in my previous research, to have a forecasting ability over violent tendencies and murder.

Defence: Is it not true though that your research only found these results in one study, and has not been repeated in other investigations. Therefore, in layperson terms, the traits you have found in Paul McGinn may not point to murder?

Dr Burrhus Freud: Yeah, you are correct. My research has had reliability and validity issues. Therefore, there is no guarantee that the traits measured imply murder. Also, the traits measured

in Paul McGinn are commonly found to be high in salesman. So he may be high on psychopathy, narcissism and have a low moral compass because he is a salesman rather than a murderer.

Prosecution: I would now like to call Forensic biologist Dr Watson Crick. Dr Crick, can you tell us about the biological evidence found during the investigation?

Dr Crick: A smashed pitcher was found next to the victim, which contained the blood of Jennifer Ramsay and had traces of Paul McGinn's DNA. This suggests that the pitcher was the murder weapon. The DNA evidence proposes that there is a one in 10 million chance of the DNA found belonging to someone else other than Paul McGinn.

Defence: However, is it not true that unidentified DNA was also found on the pitcher? Also, a pitcher is a commonly used household object, so surely, it is not really a strange finding that Jennifer's Fiancé's DNA would be found on the pitcher?

Dr Crick: Yes, this is true, a trace of unidentified DNA was found on the pitcher. This finding is disconcerting. Also, DNA evidence can be transferred easily, and it would make sense that Jennifer's Fiancé' may have used the pitcher for drinking juice.

Closing Statements

Prosecution: The eyewitness testimony places Paul to the scene of the crime. The biological evidence attaches Paul to the murder weapon. The expert testimony from Dr Freud showed that the suspect had traits associated with psychopathy and had a low moral compass, which have been shown to be predictive factors in relation to murder. The confession produced the narrative of how Paul murdered Jennifer. Paul McGinn is guilty of homicide.

Defence: The eyewitness testimony could be inaccurate as the witness was intoxicated and did not have her glasses, and the DNA evidence only proves that Paul may have used a pitcher to drink juice, not to murder his Fiancé'. Dr Freud's research lacked scientific rigour, which nullifies the implications of the personality traits found within Paul. The confession was fabricated by an ex-friend of Paul to escape the judicial system. Paul is innocent.

Judge: Remember to give a guilty verdict you must think that the suspect was guilty beyond reasonable doubt.

Vignette Two (weak anchor counterbalance 2)

Opening statement

On the 9th of March, 2016, at approximately 3:00am, Jennifer Ramsay (aged 23) was found dead in her house by her friend Cara Luby. It is estimated that she may have died between the hours of 23:00 pm and 2:00 am. It is thought that the cause of death was through severe head trauma. She was found with a crack in her skull, a broken nose; as well as a fractured Jaw. Jennifer also suffered from a broken thumb, lacerations on her wrist and scratches on her neck and face. Jennifer was currently working as a care worker, and supported individuals with violent tendencies. The defendant who has been charged for her murder is Paul McGinn (aged 25), he was Jennifer's fiancé', and is currently working as an insurance salesman.

Evidence

Prosecution: I would like to call Paul McGinn's friend Stuart Brett to the stand. Stuart, did Paul confess to you about the murder he committed on the 9th of March 2016?

Stuart Brett: Yes, she had apparently been having an affair with our friend David Fullerton. David had been messaging Jennifer inappropriately for a while, he had also had met up with her for sexual intercourse on several occasions. Paul told me that he had found out about this, he confronted her, she threatened to end the engagement and to start dating Mr Fullerton. Paul told me this made him angry, and that they got into a fight, and both of them started hitting one another. Then, to end the fight Paul, apparently, grabbed the pitcher and slammed it against Jennifer's skull.

Defence: However, is it not true that you had also been charged with Jennifer's murder previously? And, that this evidence only came to light after the charges were dropped?

Stuart Brett: Yes, I was charged, but those charges were dropped. I do not care for your insinuation that I am trying to frame Paul.

Prosecution: I will now call expert witness Dr Burrhus Freud to the witness stand. Dr Freud is an expert in psychopathy and dark personality traits.

Dr Burrhus Freud: Paul McGinn was observed, interviewed and completed several inventories. It was found that he displayed psychopathic traits, narcissistic behaviour (i.e. a sense of grandeur), and a low moral compass. These traits have been found, in my previous research, to have a forecasting ability over violent tendencies and murder.

Defence: Is it not true though that your research only found these results in one study, and has not been repeated in other investigations. Therefore, in layperson terms, the traits you have found in Paul McGinn may not point to murder?

Dr Burrhus Freud: Yeah, you are correct. My research has had reliability and validity issues. Therefore, there is no guarantee that the traits measured imply murder. Also, the traits measured in Paul McGinn are commonly found to be high in salesman. So he may be high on psychopathy, narcissism and have a low moral compass because he is a salesman rather than a murderer.

Prosecution: I would like to call Kirstie Lawson to the witness stand. Kirstie, is it true that you saw Paul McGinn hovering around Jennifer's house at 1:00?

Kirstie: Yes, I live across the road from Jennifer. I knew her well, and I had been to several parties with her. The day she died I was walking home, and just before I arrived home, I saw Paul standing outside her house. He was acting kind of erratically. He was acting very odd.

Defence: Is it not true that you had been out drinking that night and had lost you glasses? Therefore, you cannot be sure that it was Paul who you saw?

Kirstie: Yes, that is true, I had been drinking. I guess it may have been someone else.

Prosecution: I would now like to call Forensic biologist Dr Watson Crick. Dr Crick, can you tell us about the biological evidence found during the investigation?

Dr Crick: A smashed pitcher was found next to the victim, which contained the blood of Jennifer Ramsay and had traces of Paul McGinn's DNA. This suggests that the pitcher was the murder weapon. The DNA evidence proposes that there is a one in 10 million chance of the DNA found belonging to someone else other than Paul McGinn.

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Dr Crick: Yes, this is true, a trace of unidentified DNA was found on the pitcher. This finding is disconcerting. Also, DNA evidence can be transferred easily, and it would make sense that Jennifer's Fiancé' may have used the pitcher for drinking juice.

Closing Statements

Prosecution: The eyewitness testimony places Paul to the scene of the crime. The biological evidence attaches Paul to the murder weapon. The expert testimony from Dr Freud showed that the suspect had traits associated with psychopathy and had a low moral compass, which have been shown to be predictive factors in relation to murder. The confession produced the narrative of how Paul murdered Jennifer. Paul McGinn is guilty of homicide.

Defence: The eyewitness testimony could be inaccurate as the witness was intoxicated and did not have her glasses, and the DNA evidence only proves that Paul may have used a pitcher to drink juice, not to murder his Fiancé'. Dr Freud's research lacked scientific rigour, which nullifies the implications of the personality traits found within Paul. The confession was fabricated by an ex-friend of Paul to escape the judicial system. Paul is innocent.

Judge: Remember to give a guilty verdict you must think that the suspect was guilty beyond reasonable doubt.

Vignette Two (strong anchor counterbalance 2)

Opening statement

On the 9th of March, 2016, at approximately 3:00am, Jennifer Ramsay (aged 23) was found dead in her house by her friend Cara Luby. It is estimated that she may have died between the hours of 23:00 pm and 2:00 am. It is thought that the cause of death was through severe head trauma. She was found with a crack in her skull, a broken nose; as well as a fractured Jaw. Jennifer also suffered from a broken thumb, lacerations on her wrist and scratches on her neck and face. Jennifer was currently working as a care worker, and supported individuals with violent tendencies. The defendant who has been charged for her murder is Paul McGinn (aged 25), he was Jennifer's fiancé', and is currently working as an insurance salesman.

Evidence

Prosecution: I would now like to call Forensic biologist Dr Watson Crick. Dr Crick, can you tell us about the biological evidence found during the investigation?

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Prosecution: I will now call expert witness Dr Burrhus Freud to the witness stand. Dr Freud is an expert in psychopathy and dark personality traits.

Dr Burrhus Freud: Paul McGinn was observed, interviewed and completed several inventories. It was found that he displayed psychopathic traits, narcissistic behaviour (i.e. a sense of grandeur), and a low moral compass. These traits have been found, in my previous research, to have a forecasting ability over violent tendencies and murder.

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Kirstie: Yes, I live across the road from Jennifer. I knew her well, and I had been to several parties with her. The day she died I was walking home, and just before I arrived home, I saw Paul standing outside her house. He was acting kind of erratically. He was acting very odd.

Defence: Is it not true that you had been out drinking that night and had lost you glasses? Therefore, you cannot be sure that it was Paul who you saw?

Kirstie: Yes, that is true, I had been drinking. I guess it may have been someone else.

Prosecution: I would like to call Paul McGinn's friend Stuart Brett to the stand. Stuart, did Paul confess to you about the murder he committed on the 9th of March 2016?

Stuart Brett: Yes, she had apparently been having an affair with our friend David Fullerton. David had been messaging Jennifer inappropriately for a while, he had also had met up with her for sexual intercourse on several occasions. Paul told me that he had found out about this, he confronted her, she threatened to end the engagement and to start dating Mr Fullerton. Paul told me this made him angry, and that they got into a fight, and both of them started hitting one another. Then, to end the fight Paul, apparently, grabbed the pitcher and slammed it against Jennifer's skull.

Defence: However, is it not true that you had also been charged with Jennifer's murder previously? And, that this evidence only came to light after the charges were dropped?

Stuart Brett: Yes, I was charged, but those charges were dropped. I do not care for your insinuation that I am trying to frame Paul.

Closing Statements

Prosecution: The eyewitness testimony places Paul to the scene of the crime. The biological evidence attaches Paul to the murder weapon. The expert testimony from Dr Freud showed that the suspect had traits associated with psychopathy and had a low moral compass, which have been shown to be predictive factors in relation to murder. The confession produced the narrative of how Paul murdered Jennifer. Paul McGinn is guilty of homicide.

Defence: The eyewitness testimony could be inaccurate as the witness was intoxicated and did not have her glasses, and the DNA evidence only proves that Paul may have used a pitcher to drink juice, not to murder his Fiancé'. Dr Freud's research lacked scientific rigour, which nullifies the implications of the personality traits found within Paul. The confession was fabricated by an ex-friend of Paul to escape the judicial system. Paul is innocent.

Judge: Remember to give a guilty verdict you must think that the suspect was guilty beyond reasonable doubt.

Vignette one (strong anchor counterbalance 1)

Opening statement

On the 28th of January, 2016, at approximately 2:00am, Amanda Hamilton (aged 22) was found dead in her house by her flatmate Rebecca Grandison. It is estimated that she may have died between the hours of 22:00 pm and 1:00 am. It is thought that the cause of her death was asphyxiation. She was found with lacerations around her neck; as well as evidence of choking. Amanda also suffered from a broken wrist, a fractured jaw and scratches on her shoulder, which may have hinted that she had tried to fight back against her murderer. Rebecca was currently completing her Masters in Psychology. The defendant who has been charged for her murder is Graeme Ralph, he was Amanda's Boyfriend (aged 24) and is currently a PhD student studying forensic psychology.

Evidence

Prosecution: I would now like to call Forensic biologist Dr Charles Mendel. Is it true that Graeme Ralphs DNA was found on Amanda Hamilton?

Dr Charles Mendel: Yes, Graeme's DNA was found on Amanda's neck, and Amanda's DNA was found on Graeme's clothes and under his fingernails. The combined biological evidence suggested that the likelihood of someone else transferring DNA to both Amanda and Graeme is about one in 16 million.

Defence: However, Dr Mendel, Amanda and Graeme were a couple. Surely it makes sense that DNA from one of them would be found on the other person in the couple, and vice versa?

Dr Charles Mendel: Yeah you are correct. DNA can be transferred very easily. The DNA does show that Amanda and Graeme had contact the day of Amanda's murder. However, it does not mean that Graeme physically harmed Amanda.

Prosecution: I would like to call Sandra Clooney to the witness stand. Sandra, is it true that you saw Graeme Ralph leaving Amanda's flat at 24:00?

Sandra: Yes, I live across the landing from Amanda and Rebecca. I knew them well, and I had been to several parties with them. The day she died I was up late as I could not sleep. So I was smoking out of the window. When I looked outside, I saw Graeme rushing off at 24:00. This wasn't normal of him as he usually stayed at Amanda's.

Defence: Sandra, is it not true that the police seized your house that night and found that you were under the influence of alcohol and marijuana? And, you, therefore, cannot be 100% sure that you saw Graeme Ralph leaving your building block?

Sandra: Yes, that is true I had been drinking. I guess it may have been someone else.

Prosecution: I will now call expert witness Dr Sigmund Skinner who specialises in criminal personality traits and decision making strategies.

Dr Skinner: Based on several questionnaires, observations and interviews it seems that Graeme has psychopathic tendencies and is quite impulsive. During the interviews and observations he showed signs of anger, and on occasions exploded with frustration. My personal opinion is that he is a hostile individual who tried to control Amanda. Amanda's resistance may have caused him to act impulsively, which may have led to Amanda's death.

Defence: However, is it not true Dr Skinner that Graeme has no record of violent assault or aggressive tendencies? Would this not make it less likely for Graeme to have murdered Amanda?

Dr Skinner: Yes, you are right. My research has highlighted that there is a positive association between the frequency of domestic abuse attacks and the likelihood of murder. Therefore, it could

be said that because Graeme has no prior convictions for domestic abuse it may be unlikely that he committed the murder.

Prosecution: I would like to call Graeme Ralphs friend Alex Kirkwood to the stand. Alex, did Graeme confess to you about the murder he committed on the 28th of January 2016?

Alex Kirkwood: Yeah, he had been saying for weeks before it that Amanda was moving to Australia after her masters. He kept saying that he wasn't going to let that happen. He would do anything to stop her leaving. He said, that on the night she died they got into an argument over her leaving. He said that he grabbed her, she slapped him. Then he hit her back and grabbed her neck, and she tried to fight him off and before he knew it she was dead. He had told me because he said that his guilt had become too strong.

Defence: Is it not true that you and Graeme had recently had a fight? He had sent you to hospital as he had caught you messaging and fliting with Amanda?

Alex Kirkwood: Yeah, that is true, I had been messaging Amanda for a while. When he found out he beat me up, my girlfriend found out also and left me, and all of me and Graeme's friends took his side. He left me with nothing, I think that prison would be the perfect place for a spiteful man like Graeme.

Closing Statements

Prosecution: The eyewitness testimony places Graeme to the scene of the crime. The biological evidence attaches Graeme to the victim. The expert testimony from Dr Sigmund Skinner showed that the suspect had a volatile and impulsive nature, and the confession highlighted how Graeme Ralph murdered Amanda Hamilton. Graeme Ralph is guilty of homicide, and should be convicted.

Defence: The eyewitness testimony could be wrong as the witness was intoxicated and high, and the DNA evidence only showed contact, not murder. Dr Sigmund Skinner admitted that because Graeme had no prior convictions for domestic abuse that it may be unlikely that Graeme committed murder, and the confession was fabricated as a revenge plot by a sadistic ex-friend of Graeme. Graeme is innocent.

Judge: Remember to give a guilty verdict you must think that the suspect was guilty beyond reasonable doubt.

Counterbalancing for Experiment Three

Information sheet, Consent form and Debrief for Pilot and Quasi-Experiment

Pilot

Information sheet

My name is Lee Curley, and I am a Postgraduate student from the School of Life, Sport & Social Sciences at Edinburgh Napier University. The title of my project is: **"Is the Jury Still Out? The Decision Making Strategies of Jurors**".

This study is a pilot, and the findings from it will be used to set up a future experiment. I am looking for volunteers to participate in this project. I am looking for *around* 60 participants in my project. The only exclusion and inclusion criteria relate to you being able to participate in a real life jury:

- Are you eligible to vote?

- Are you eligible to be on a jury?

If you agree to participate in the study, there will be a set procedure you will have to go through. Firstly, you will be given a questionnaire to fill out (i.e. name, age, occupation and nationality). Then you will be asked several questions surrounding how you view evidence that is normally displayed in a court trial. The average time should be approximately **10 minutes.**

All data will be anonymised (un-identifiable) as much as possible. Your name will be replaced with a participant number, *i.e. participant 1*, and it will not be possible for you to be identified in any reporting of the data gathered. All data collected will be kept in a secure place (e.g. stored on a pc that is password protected) **to which only the researcher will have access**. You have the right to withdraw at any time. However, you must tell the researcher within a reasonable time limit (a week after completing the study) that you want your data to be removed. This is because it will not be possible to identify your data once the data has been anonymised**.** The data will be kept till the research is published, following which all data that could identify you will be destroyed. Likewise, the data will be presented at conferences.

If you have any further questions, you are welcome to contact me, or my director of studies:

Lee Curley (BSc Hons)	Dr Rory Maclean
School of Life, Sport & Social Sciences	School of Life, Sport & Social Sciences
Edinburgh Napier University	Edinburgh Napier University
Sighthill Campus	Sighthill Campus
Sighthill Court	Sighthill Court
Edinburgh EH11 4BN	Edinburgh EH11 4BN
Email: 10004435@live.napier.ac.uk	Email: r.maclean@napier.ac.uk
Tel: (0131) 455 2350	Tel: (0131) 455 6148

If you would like to contact an independent person, who knows about this project but is not involved in it, you are welcome to contact Alex McIntyre; who is my independent advisor. Her contact details are given below:

Dr Alex McIntyre: Lecturer;

Faculty of Health, Life & Social Sciences; Edinburgh Napier University

Sighthill Campus,

Sighthill Court,

Edinburgh EH11 4BN,

Email: A.McIntyre@Napier.ac.uk).

If you have:

- Read and understood this information sheet,

- All questions you had have now been answered,

- And you would now like to be a participant in the study,

Then please now see the consent form.

"**Is the Jury Still Out? The Decision Making Strategies of Jurors**"

Consent form

I have **read and understood** the information sheet and this consent form. I have had an **opportunity to ask questions** about my participation.

I understand that I am under **no obligation** to take part in this study.

I **understand** that I have the right to **withdraw** from this study at any stage (**before data entry**) without giving any reason.

I agree to participate in this study.

Name of participant: _____

Signature of participant: _____

Signature of researcher: _____

Date: _____

Contact details of the researcher:

Name of researcher: Lee Curley (BSc Hons)

Address: PhD, Psychology,

School of Life, Sport & Social Sciences,

Edinburgh Napier University,

Sighthill Campus, Sighthill Court,

Edinburgh, EH11 4BN,

Room number: 2.B.46.

Email: 10004435@live.napier.ac.uk

Tel: (0131) 455 2350

Debrief

This pilot will be used to inform the design of future experiments. The current pilot was essential as it allowed the researcher to establish the pieces of evidence that are important to legal laypersons. This will then allow a study to be designed. If you do not want your data to be used please inform the researcher now, or email them as soon as possible (i.e. within the next week). Finally, if you wish to contact someone independent, you can contact Dr Alex McIntyre- previously mentioned- at: email: A.McIntyre@Napier.ac.uk.

Do you have any questions regarding the experiment or my research? Please do not hesitate to ask.

Thanks again for all your help.

If you have any further questions, you are welcome to contact me, or my director of studies:

Lee Curley (BSc Hons)	Dr Rory Maclean
School of Life, Sport & Social Sciences	School of Life, Sport & Social Sciences
Edinburgh Napier University	Edinburgh Napier University
Sighthill Campus	Sighthill Campus
Sighthill Court	Sighthill Court
Edinburgh EH11 4BN	Edinburgh EH11 4BN
Email: 10004435@live.napier.ac.uk	Email: r.maclean@napier.ac.uk
Tel: (0131) 455 2350	Tel: (0131) 455 6148

Information sheet, Consent Form and Debrief Sheet for Quasi-Experiment Three

My name is Lee Curley, and I am a Postgraduate student from the School of Life, Sport & Social Sciences at Edinburgh Napier University. The title of my project is: **"Is the Jury Still Out? The Decision Making Strategies of Jurors**".

This study will explore how jurors make decisions. The findings of the project will be useful in a forensic and legal setting. I am looking for volunteers to participate in the project. I am looking for *around* 120 participants in my project. The only exclusion and inclusion criteria relate to you being able to participate in a real life jury:

- Are you eligible to vote?

- Are you eligible to be on a jury?

If you agree to participate in the study, there will be a set procedure you will have to go through. Firstly, you will be given a questionnaire to fill out (i.e. name, age, occupation and nationality). Then you will hear two homicide trials through an audio file. As well as making a verdict on the trials, you will also be asked to rate the individual pieces of evidence in regards to a rating scale. This procedure will be repeated twice, with two varying vignettes. How long the experiment lasts will vary between participants, there is no set limit. The average time should be approximately **45 minutes.**

All data will be anonymised (un-identifiable) as much as possible. Your name will be replaced with a participant number, *i.e. participant 1*, and it will not be possible for you to be identified in any reporting of the data gathered. All data collected will be kept in a secure place (e.g. stored on a pc that is password protected) **to which only the researcher will have access**. You have the right to withdraw at any time. However, you must tell the researcher within a reasonable time limit (a week after completing the study) that you want your data to be removed. This is because it will not be possible to identify your data once it has been anonymised. The data will be kept till the research is published, following which all data that could identify you will be destroyed. Likewise, the data will be presented at conferences.

If you have any further questions, you are welcome to contact me, or my director of studies:

Lee Curley (BSc Hons)	Dr Rory Maclean
School of Life, Sport & Social Sciences	School of Life, Sport & Social Sciences
Edinburgh Napier University	Edinburgh Napier University
Sighthill Campus	Sighthill Campus
Sighthill Court	Sighthill Court
Edinburgh EH11 4BN	Edinburgh EH11 4BN
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Tel: (0131) 455 2350   Tel: (0131) 455 6148

If you would like to contact an independent person, who knows about this project but is not involved in it, you are welcome to contact Alex McIntyre; who is my independent advisor. Her contact details are given below:

Dr Alex McIntyre: Lecturer;

Faculty of Health, Life & Social Sciences; Edinburgh Napier University

Sighthill Campus,

Sighthill Court,

Edinburgh EH11 4BN,

Email: A.McIntyre@Napier.ac.uk).

If you have:

- Read and understood this information sheet,

- All questions you had have now been answered,

- And you would now like to be a participant in the study,

Then please now see the consent form.

"**Is the Jury Still Out? The Decision Making Strategies of Jurors**"

Consent form

I have **read and understood** the information sheet and this consent form. I have had an **opportunity to ask questions** about my participation.

I understand that I am under **no obligation** to take part in this study.

I **understand** that I have the right to **withdraw** from this study at any stage (**before the data has been entered**) without giving any reason.

I agree to participate in this study.

Name of participant: _____

Signature of participant: _____

Signature of researcher: _____

Date: _____

Contact details of the researcher:

Name of researcher: Lee Curley (BSc Hons)

Address: PhD, Psychology,

School of Life, Sport & Social Sciences,

Edinburgh Napier University,

Sighthill Campus, Sighthill Court,

Edinburgh, EH11 4BN,

Room number: 2.B.46.

Email: 10004435@live.napier.ac.uk

Tel: (0131) 5716

Debrief

The true aims of this research relate to how jurors make decisions. The information you have just given me will allow me to find out which variables relate to the point when someone makes a decision, and how this point is affected by initial biases and evidence interpretations. Specifically though, this research aims to focus on how the reaching of threshold (i.e. making a decision before all the evidence has been shown) is affected by how many options are available, pre-trial biases and the first piece of evidence shown. The implications for this research may be great in regards to juror decision making, and I therefore appreciate the help that you have given me. Also, the questionnaire you filled out (earlier) had the purpose of categorising you into one of these three groups: Pro-prosecution, pro-defence and neutral. You can ask the researcher at this time, which group you were in, if you desire. Thanks for your participation throughout this experiment. Although, you can still withdraw your data if you want, and do not have to give a reason why.

Please tick here if you want your data to be used

If you suffer any distress from participating in this experiment please contact the Samaritans at: jo@samaritans.org. Finally, if you wish to contact someone independent, you can contact Dr Alex McIntyre- previously mentioned- at: email: A.McIntyre@Napier.ac.uk.

Do you have any questions regarding the experiment or my research? Please do not hesitate to ask. Thanks again for all your help. If you have any further questions, you are welcome to contact me, or my director of studies:

Lee Curley (BSc Hons)	Dr Rory Maclean
School of Life, Sport & Social Sciences	School of Life, Sport & Social Sciences
Edinburgh Napier University	Edinburgh Napier University
Sighthill Campus	Sighthill Campus
Sighthill Court	Sighthill Court
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Poster for Quasi-Experiment Three

Is the Jury Still Out?
## The Decision Making Strategies of Jurors.

The study aims to: look at the decision making strategies of

jurors. In order to be a participant you need to:

- Be **eligible** to vote.

- Be **eligible** to be on a jury.

Participants required for a legal psychology experiment

Sessions take place at the Sighthill campus of Edinburgh Napier University, and will last approximately **45 minutes**. Each participant will complete **two** short decision making tasks, **which focus on murder trials.**

Lee Curley (psychology PhD student)
Email: 10004435@live.napier.ac.uk.

13. Appendix E

Publications from this thesis.

Paper one:

Heuristics: the good, the bad, and the biased. What value can bias have for decision makers?

This discussion paper will look at heuristics (rule of thumb techniques for decision making), (Tversky & Kahneman, 1974) and their potential value. Typically, heuristics have been viewed negatively (Gigerenzer & Goldstein, 1996), with research suggesting that heuristics bias how individuals think, which may create sub-optimal performance (Tversky & Kahneman, 1974). However, researchers, such as Gigerenzer and Goldstein (1996), have highlighted that a bias in decision making may not necessarily be a negative feature of heuristics. This paper will look at two main areas of research in an attempt to show whether the biases that heuristics cause are always detrimental. The first area of research that will be focussed upon is the heuristics and biases programme (Tversky & Kahneman, 1974). This approach to researching decision making proposes that heuristics are quick and cause biases that have a negative impact on decision making processes. The second area of research is the fast and frugal approach (Gigerenzer & Goldstein, 1996). The fast and frugal approach has shown that individuals can make accurate and quick decisions using a small amount of information. The article aims to create some debate over the usefulness of heuristics and the potential value that biases may have.

Biases cause sub-optimal decision making

The discussion will start of by looking at the heuristics and biases programme by Tversky and Kahneman (1974). This will be the first area of research that will be focussed upon for two reasons. One reason is because this approach revolutionised decision making research as it highlighted that human decision making has the potential to be flawed (Tversky & Kahneman, 1974). The second reason is because the research from the heuristics and biases programme has influenced many areas of society, from finance to law (Korobkin & Ulen, 2000). Nevertheless, the heuristics developed by Tversky and Kahneman (1974) were unconscious rule of thumb techniques, which suggested that decision makers sometimes emphasised speed over accuracy. Two of the most famous of these heuristics will now be explained.

The first heuristic that will be mentioned is the representative heuristic (Korobkin & Ulen, 2000; Tversky & Kahneman, 1974). This heuristic relates to the use of stereotypes, and the ignorance of statistics. Individuals will use stereotypes over probabilities to make decisions about certain questions (Korobkin & Ulen, 2000; Tversky & Kahneman, 1974). For example, if you say someone is a sociable individual, who has a fascination for the cinema, and who is good

at doing accents, and then ask people to decide whether they are an actor or a carpenter, they may say the person is an actor. This may seem a reasonable response, however, it is important to consider statistics. For instance, there are more carpenters in the United Kingdom than actors, which suggest statistically it is more likely that the person, in the previous statement, is a carpenter rather than an actor. This is an obvious bias. The representative heuristic highlighted to researchers that individuals are not like computers - people are not 100% rational, 100% of the time.

A second heuristic that was discovered by Tversky and Kahneman (1974) was the availability heuristic. This heuristic was formed on the assumption that people base probabilities on the ease at which something comes to mind. For example, someone who has just watched Jaws may over-estimate the probability of a shark attack. One positive about this heuristics is that it allows quick decision making (Tversky & Kahneman, 1974). However, it does bias individuals into over-estimating the likelihood of an event, or situation, occurring. Thus the availability heuristic results in quick, but biased, decision making.

It is evident from discussing two of Tversky and Kahneman's heuristics (1974) that rule of thumb techniques may create potentially negative biases in decision makers. These biases may have disastrous outcomes when they happen in real life decision making opportunities; such as a collection of jurors giving a guilty verdict based on a stereotype. However, the biases proposed by this research are not always negative. Research by Gigerenzer and Goldstein (1996) hints at quite the opposite.

Biases cause optimal decision making

Inspired by bounded rationality (which suggests we make adequate rather than optimal decisions as our environment inhibits us from the latter; Simon, 1956), Gigerenzer and Goldstein (1996) produced a non-compensatory model, known as the probabilistic mental model. This model suggests that individuals may use different types of heuristics for different environments (Mellers, 1998). They coined the term "*adaptive toolbox*" for describing the ability of decision makers to use different cognitive strategies in various environments (Gigerenzer & Goldstein, 1996**;** Mellers, 1998). Further, all the heuristics mentioned by Gigerenzer and Goldstein (1996) go through the same procedure. For instance, all heuristics start with the "recognition principle". This can affect how decisions are made. For example, if neither of the choices are recognised, it could cause the individual to guess, but if only one alternative is recognised then it could allow the decision maker to make a fast and frugal verdict.

Nevertheless, if both alternatives are recognised then the individual will continue to search for information to discriminate between the outcomes (Gigerenzer & Goldstein, 1996). This is called information search (Gigerenzer & Goldstein, 1996). If a cue is found that discriminates

between the two options then search stops; if not then the search continues, and if no discriminatory cue is found then the participant will have to guess (Gigerenzer & Goldstein, 1996). The procedure that these fast and frugal heuristics follow allows the decision maker to ignore some information, which then allows only useful information to be used. In other words, when heuristics cause a bias it allows only optimal information to be used, which allows the decision maker to use a smaller amount of information that is more manageable (Snook & Cullen, 2008). There are many of these fast and frugal heuristics that use biases to make accurate decisions. However, one specific heuristics will now be focussed upon.

The most researched fast and frugal heuristic, which was proposed by Gigerenzer and Goldstein (1996), is the "*Take The Best*" Heuristic (TTB). This heuristic has been widely researched in many decision making areas, from economics to sport (Andersson, Ekman, & Edman, 2003; Bröder & Gaissmaier, 2007). The 'Take The Best' heuristic follows the basic structure of heuristics, mentioned earlier, quite rigorously (Gigerenzer & Goldstein, 1996). The heuristic starts off with the recognition principle (Pachur, Bröder, & Marewski, 2008). Then, if both alternatives are recognised then more information is needed (Gigerenzer & Goldstein, 1996). This information is subsequently searched by starting off with the most valid piece of information, and ending with the least valid cue if no discriminatory piece of evidence has been found (Gigerenzer & Goldstein, 1996).

This rank order is based upon cue validity (i.e. how many correct decisions can be made from that particular cue). However, information search along these ranked cues will only stop, allowing a decision to be made, when a cue with a high discriminatory value is found (Gigerenzer & Goldstein, 1996). A high discriminatory value basically means that a cue has a high likelihood of allowing an individual to discriminate between two options (Gigerenzer & Goldstein, 1996). This therefore highlights that the Take The Best Approach is a non-compensatory model (Gigerenzer & Goldstein, 1996). This is because the most valid cue, with the highest discriminatory value, cannot be over-ruled by a collection of less valid cues (Bergert & Nosofsky, 2007; Bröder, & Schiffer 2003). This shows that the Take The Best approach is a heuristic that biases the decision maker into using only valid information.

A good way of describing this popular non-compensatory heuristic is "take the best, ignore the rest" (Gigerenzer & Goldstein, 1996). This ignorance of the rest has been found to increase accuracy (Gigerenzer & Goldstein, 1996). Consequently, it can be proposed that biased decision making can lead to accurate judgements. For instance, research shows that German and American students are better at distinguishing the sizes of cities in a foreign country when compared to their own country (Goldstein & Gigerenzer, 1996). The rationale for this was that individuals would know less about cities in foreign countries (Gigerenzer & Goldstein, 1996). This has shown that sometimes using less information can be more effective (Andersson,

Ekman, & Edman, 2003). It has also been found, that the Take The Best approach was equal to, and better than some linear weighted models (i.e. more rational models; Gigerenzer & Goldstein, 1996). This consequently insinuates that simple algorithms that bias the decision maker may be more optimal, and realistic, than previous more rational decision making models. Conversely, some argue that the Take the Best approach is flawed as it may not be sensible to assume that people count information in regards to ecological validity and then have the processing capacity to rank it (Dougherty, Franco-Watkins, & Thomas, 2008). Furthermore, the Take the Best approach is promising when it highlights that bias may be beneficial. However, more research is needed to determine how conceivable these fast and frugal heuristics really are. In conclusion, a plethora of research proposes that heuristics may be negative and may bias decision makers into making sub-optimal decisions. Nevertheless, more contemporary research suggests that heuristics may out-perform more rational methods of decision making because of the biases they create. This highlights that biased decision making may lead to accurate decision making. Further, a bias is an effective way for decision makers to ignore irrelevant information, which allows decision makers to make use of more relevant information in an efficient way. For example, biases may allow detectives to ignore irrelevant evidence, stock-brokers to focus on the most relevant information, and voters to only consider the points most important when voting (Snook & Cullen, 2008). This article will hopefully produce some debate in the academic community and influence decision making scientists to think about the potential value that biased decision making may have.

Correspondence

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References

Andersson, P., Ekman, M., & Edman, J. (2003). Forecasting the fast and frugal way: A study of performance and information-processing strategies of experts and non-experts when predicting the World Cup 2002 in soccer. *Working Paper Series in Business Administration*, 1-26.

Bergert, F. B., & Nosofsky, R. M. (2007). A response-time approach to comparing generalized rational and take-the-best models of decision making. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, *33*, 107-129.

Bröder, A., & Gaissmaier, W. (2007). Sequential processing of cues in memory-based multiattribute decisions. *Psychonomic Bulletin & Review*, *14*, 895-900.

Bröder, A., & Schiffer, S. (2003). Take The Best versus simultaneous feature matching: Probabilistic inferences from memory and effects of representation format. *Journal of Experimental Psychology: General*, *132*, 277-293.

Dougherty, M. R., Franco-Watkins, A. M., & Thomas, R. (2008). Psychological plausibility of the theory of probabilistic mental models and the fast and frugal heuristics. *Psychological Review*, *115*, 199-213.

Gigerenzer, G., & Goldstein, D. (1996). Reasoning the Fast and Frugal way: Models of Bounded Rationality. *Psychological review, 103*, 650- 669.

Korobkin, R. B., & Ulen, T. S. (2000). Law and behavioral science: Removing the rationality assumption from law and economics. *California Law Review*, 1051-1144.

Mellers, B. A. (1998). Judgement and Decision-Making. *Annual Review Psychology, 49,* 447-477

Newell, B. R., Weston, N. J., & Shanks, D. R. (2003). Empirical tests of a fast-and-frugal heuristic: Not everyone "takes-the-best". *Organizational Behavior and Human Decision Processes*, *91*, 82-96.

Pachur, T., Bröder, A., & Marewski, J. N. (2008). The recognition heuristic in memory-based inference: is recognition a non-compensatory cue?. *Journal of Behavioral Decision Making*, *21*, 183-210.

Simon, H. A. (1956). Rational choice and the structure of the environment. *Psychological review*, *63*, 1-11.

Snook, B., & Cullen, R. M. (2008). Bounded rationality and criminal investigations: Has tunnel vision been wrongfully convicted. Criminal investigative failures, 71-98.

Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases, *Science*, New Series, *185*, 1124-1131.

Paper Two:

Decision Making Process of Jurors

Lee Curley, PhD Candidate

Edinburgh Napier University, UK

Jury decision making refers to when a decision is made by legal lay persons within a courtroom setting. This decision, in criminal trials, centres on the guilt of a suspect. Jurors are given the option of returning either a 'guilty' or 'not guilty' verdict (the 'not proven' verdict is also available in Scotland; Hope, Greene, Memon, Gavisk, &-Houston, 2008). To assess the credibility of a legal system that uses jurors, researchers have assed how jurors reach verdicts and what unconscious decision making biases they may be subjected to.

Models of Juror Decision Making

Pennington and Hastie (1992) hypothesised that jurors evaluate the evidence presented in court and choose a verdict by creating a narrative. This method of decision making is called the Story Model. In this model, information from the case, prior experience of similar cases, and expectations surrounding the suspect are combined into a 'story'. Story acceptance is said to come from two main principles: (i) story coverage and (ii) story coherence. The uniqueness of a story may contribute to how much confidence a juror can place in their story. The best fitting story then allows a verdict to be reached (Pennington & Hastie, 1992)

An alternative model, proposed by Simon (2004), is the Coherence Model, which postulates the importance of coherence in jury decision making. This model suggests that information that matches a favoured outcome is perceived as powerful evidence, whereas information that supports the least favoured outcome is perceived as weak (Simon, 2004). Jurors have depictions or representations of elements (i.e. knowledge and information) that may affect their corresponding decisions. These depictions, which relate to the decision at hand, are stored in the mind as "mental models" (Simon, 2004). Simon (2004) suggests that these mental models are connected in a web like fashion and Interact with one another when activated. Mental models that do not interact become inactivated, and subsequently do not affect the decision making outcome. This process occurs so that information is perceived as being coherent in order for a decision to be made.

Research on biases in the court room

Juror demographic factors have a significant impact on their decision making. Research on racial bias for instance, which has received extensive attention in the literature, has found that black jurors are more lenient on black suspects than white jurors (Ellsworth & Sommers, 2000). Ellsworth and Sommers (2000) also discovered that white jurors were less prejudiced against black suspects when race was made salient, but when race was not made salient, white jurors were more prone to racial biases towards black suspects. Racial bias appears to be mitigated by social status, as white jurors of a dominant position in society were less likely to be biased against black suspects in comparison to their lower status counterparts (Kemmelmeier, 2005). Additionally, Esqueda, Espinoza and Culhane (2008) investigated the effects on race (Mexican American versus European American), socioeconomic status (SES; low versus high), and crime status (embezzlement versus grand theft auto) on juror decision making. These authors found that Mexican Americans with a low SES suffered more guilty verdicts and higher culpability ratings than European Americans and Mexican Americans of a higher SES, irrespective of crime status.

Female jurors are found to be more supportive of the victim in comparison to male jurors, and male suspects were evaluated more harshly than female suspects, particularly by male jurors if the child was also male (Quas, Bottoms, Haegerich, & Nysse-Carris, 2002). In addition, although suspect age did not affect juror judgements, "older" jurors were more confident in their decisions

and attributed more blame to suspects than "younger" jurors did (Higgins, Heath, & Grannemann, 2007).

In addition to juror demographics, Lecci and Myers (2008) identified six factors that were significant predictors of the final judgements made by jurors: (i) conviction proneness, (ii) system confidence, (iii) cynicism towards the defense, (iv) social justice, (v) racial bias, and (vi) innate criminality. Estrada-Reynolds, Gray and-Nuñez (2015) found that jurors were not influenced by their pre-trial biases and integrated information appropriately. Further, Eva Martín, De La Fuente, De La Fuente and-García (2007) showed-that evidence strength (strong prosecution evidence/ambiguous evidence) had-the strongest impact on a juror's decisions, followed by sample type (50% students/50% general juror eligible public), and then evidence presentation (video recording/transcript). It has been suggested that deliberation between jurors might counteract individual juror biases, but individual juror results on the Pre-Trial Juror Attitude Questionnaire have been found to be a significant forecaster of verdicts even post-deliberation (Lecci & Myers, 2009).

Crime type has also been shown to have an effect on juror decision making. The more severe and calculated a crime is perceived to be, the more punitive jurors become (White, 1987). White (1987) found that suspects who had planned a robbery, but did not plan murder, were given more lenient outcomes in comparison to suspects who had committed multiple murders.

Conclusions

Juror decision-making research is an important area of research within legal psychology. Jurors may create coherent narratives in order to make decisions. This story-creation may allow for both information integration and pre-trial biases to occur. Research has also shown that common legal practices, such as deliberation, do not counteract pre-trial biases. However, more-research needs to be carried out to determine the causes of pre-trial biases and what may overcome these biases.

Quick Summary

- Jurors may create a narrative when deciding on the most appropriate verdict.

- Coherent narratives are likely to be chosen.

- Pre-trial biases such as racial bias have an effect on the final verdict.

- Strong evidence seems to have the largest impact on juror verdicts.

References

Esqueda, C. W., Espinoza, R. K., & Culhane, S. E. (2008). The effects of ethnicity, ses, and crime status on juror decision making a cross-cultural examination of euopean american and mexican american mock jurors. *Hispanic Journal of Behavioral Sciences, 30* (2), 181-199. doi: 10.1177/0739986308315319

Estrada-Reynolds, V., Gray, J., & Nunez, N. (2015). Information integration theory, juror bias, and sentence recommendations captured over time in a capital trial. *Applied Cognitive Psychology, 29* (7). 713–722. doi: 10.1002/acp.3155

Eva Martín, M., De La Fuente, l., E. De La Fuente, I., & García, J. (2007). The influence of sample type, presentation format and strength of evidence on juror simulation research. *Psychology, Crime & Law, 13*(2), 139-153. doi: 10.1080/10683160500537431

Gorphe, F. (1936). Reforms of the jury-system in Europe: France and other continental countries. *Journal of Criminal Law and Criminology (1931-1951)*, *27*(2), 155-168. Retrieved on the 13th of September, 2016, from: http://www.jstor.org/stable/1135597

Higgins, P. L., Heath, W. P., & Grannemann, B. D. (2007). How type of excuse defense, mock juror age, and defendant age affect mock jurors' decisions. *The Journal of social psychology*, *147*(4), 371-392.doi: 10.3200/SOCP.147.4.371-392

Hope, L., Greene, E., Memon, A., Gavisk, M., & Houston, K. (2008). A third verdict option: Exploring the impact of the not proven verdict on mock juror decision making. *Law and human behavior, 32* (3), 241-252. doi: 10.1007/s10979-007-9106-8

Kemmelmeier, M. (2005). The effects of race and social dominance orientation in simulated juror decision making. *Journal of Applied Social Psychology, 35*(5), 1030-1045. doi: 10.1111/j.1559-1816.2005.tb02158.x

Lecci, L., & Myers, B. (2008). Individual differences in attitudes relevant to juror decision making: Development and validation of the pretrial juror attitude questionnaire (PJAQ) 1. *Journal of Applied Social Psychology*, *38*(8), 2010-2038.doi: 10.1111/j.1559-1816.2008.00378.x

Lecci, L., & Myers, B. (2009). Predicting guilt judgments and verdict change using a measure of pretrial bias in a videotaped mock trial with deliberating jurors. *Psychology, Crime & Law, 15*(7), 619-634. doi: 10.1080/10683160802477757

Miller, M. K., Maskaly, J., Green, M., & Peoples, C. D. (2011). The effects of deliberations and religious identity on mock jurors' verdicts. *Group Processes & Intergroup Relations*, 1-16.doi: 10.1177/1368430210377458

Pennington, N., & Hastie, R. (1992). Explaining the evidence: Tests of the story model for juror decision making. *Journal of Personality and Social Psychology, 62* (2), 189-206. doi:10.1037/0022-3514.62.2.189

Quas, J. A., Bottoms, B. L., Haegerich, T. M., & Nysse-Carris, K. L. (2002). Effects of victim, defendant, and juror gender on decisions in child sexual assault cases. *Journal of Applied Social Psychology*, 32(10), 1993-2021. doi: 10.1111/j.1559-1816.2002.tb02061

Simon, D. (2004). A third view of the black box: Cognitive coherence in legal decision making. *The University of Chicago Law Review*, 511-586. Retrieved on the 13th of September, 2016, from: www.jstor.org/stable/1600674

Sommers, S. R., & Ellsworth, P. C. (2000). Race in the courtroom: Perceptions of guilt and dispositional attributions. *Personality and Social Psychology Bulletin, 26* (11), 1367-1379. doi: 10.1177/0146167200263005

White, L. T. (1987). Juror decision making in the capital penalty trial: An analysis of crimes and defense strategies. *Law and Human Behavior, 11* (2), 113-130.doi: 10.1007/BF01040445

Media Article:

The "Bastard verdict"– proven or not?

In 2013, Sean Devenney admitted to sexually assaulting three different women and conducting a solo sexual act in front of people at the T in the park festival. Despite his confession, he was given a 'not proven' verdict by a jury of his peers. This is an example of one of many cases which has made the not proven verdict controversial.

When making decisions, juries may believe that a defendant may be guilty but still have doubts. In these cases, a 'not guilty' verdict may not be the most suitable verdict to give. Rather, the not proven verdict would show to the suspect that, although they cannot be convicted on the evidence provided, the jury does not think they are innocent either.

In Scotland, juries can give one of three verdicts: guilty; not guilty; and the controversial 'not proven'. The current three verdict system evolved out of the culture and logic of the 18th century. In 1827 the not proven verdict was described as the "bastard verdict" by Sir Walter Scott, and has been openly critiqued since, with calls to reform the three verdict system being raised.

Recently, Lord Bonomy's reference group suggested that research needs to be conducted before any reform is taken. Research is important for two reasons; 1) it can show what is occurring in court and what we need to change; and 2) it allows society to place trust in institutional changes.

There are number of arguments for the not proven verdict, however. It allows a comfortable middle ground for judges and jurors, which may reflect a more realistic decision making process. Judge Gerald Sparrow suggested that the Scottish system was more rational than the more "sporting" English system. The not proven verdict also gives more security to the accused as there is two outcomes which can lead to an acquittal.

The vagueness of the not guilty verdict has also been proposed as a strength for the not proven verdict. For instance, if a judge or jury gives a guilty verdict it can be assumed that they thought that proof of guilt was above reasonable doubt. However, in the Anglo two-verdict system, 'not guilty' can mean two things: 1) the judge/jury believes that the person was truly innocent; or 2) that the judge/jury believes that it is likely that the suspect was guilty, but doubt still remained. The inclusion of not proven transforms the otherwise vague not guilty verdict into a powerful statement regarding the innocence of the suspect.

Like all controversial topics there are criticisms of the not proven verdict. There is no single definition of 'not proven', making it a vague verdict, and historically judges have been discouraged from defining it. This may mean that juries are using it and interpreting it in different ways. However, we simply do not know if this is actually the case. Further, a not proven verdict has the same outcomes as the not guilty verdict. So it may, have a different meaning, but it has the exact same consequence. Also, if a case is ambiguous, and not proven verdict is likely, should that case even reach the court room? These points raise the question, why do we need such a verdict? Finally, the not proven verdict can have negative implications for both society and the individual defendant. For instance, if a truly innocent individual is given a not proven verdict they may suffer social stigma because a jury did not declare their innocence.

Some research has been conducted on the not proven verdict, though. Research has shown that jurors gave a not proven verdict when the proof in relation to the guilt of a suspect was not clear. Lorraine Hope and colleagues (from the University of Portsmouth) suggested in their research that the not proven verdict was a second class acquittal. They found that the presence of a not proven verdict reduced the amount of guilty verdicts that were given. The implications of the research, so far, are that if the evidence in a court case is ambiguous a not proven verdict may save a defendant from conviction. These are examples drawn from a very small pool of studies examining the not proven verdict. More research is needed to evaluate the not proven verdict and

its effects on a juror's decision making process and the outcome of a jury's decision. In my own ongoing doctoral research, I use experiments to compare the two verdict (Anglo) system with the (Scottish) three verdict system. My current experiment investigates whether the three verdict system interacts with commonly studied biases, and how these interactions have an impact on the perception of guilty and verdict outcomes. Hopefully, my findings will be fruitful in regards to the utility of the not proven verdict.

The dearth of research which exists is astounding when you take into account how long the not proven verdict has existed and its impact upon our society. It is to be commended that Lord Bonomy's reference group have suggested to, and the Sottish Government are aiming to, research controversial issues in law such as the three verdict system and the current majority system. Only with high quality scientific examination can we say whether the utility of the "bastard verdict" has been proven or not.