



UNIVERSITY OF
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**Cognition in Crisis: Decision inertia and failures to
take action in multi-agency emergency response
command teams**

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By

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ABSTRACT

This thesis defines and extends the psychological concept of ‘decision inertia’: the redundant deliberation of choice for no positive gain. The concept was developed following observation in the real-world that emergency incidents were most often criticised, not because of poor decision making, but because actions simply failed. It is argued, therefore, that the need to develop a psychological understanding to explain the relationship between stimulus and *non-response* is of conceptual importance. Rather than *avoid* a choice, decision inertia is crucially associated with a strong desire to take action yet, for reasons that will be discussed in this thesis, action fundamentally fails. A Naturalistic Decision Making (NDM) approach was followed to investigate decision making in the real-world context of emergency response environments. A mixed methods approach was used to qualitatively interview command level decision makers and then explore decision making in an empirical simulation setting. Two key findings emerged from the data: (i) the relationship between uncertainty and decision inertia appeared to be *mediated* by the anticipation of negative consequences associated with both action and inaction; and (ii) the *context* of extreme environments can exacerbate these effects by making (usually adaptive) cognitive processing styles (i.e. approach goals; cognitive flexibility) inappropriate. Implications with regards to both the conceptual importance of decision inertia and more practical advice for decision making in extreme emergency contexts is provided.

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PREFACE

The preface to this thesis will describe some of the lessons and reflections that I have taken away following the four years that I have spent researching and writing this PhD thesis. My initial interest in this topic area developed from reflections in the real world that major incidents are often derailed by the inability to make decisions. Although I was aware of the challenges associated with emergency response domains, I was interested to see how these challenges interacted with the psychology of decision making; specifically with regards to decision inertia. This presented a challenge in itself, as I needed to gain access to a group of incredibly valued and important people who must crucially also be willing to get involved with research. Yet to my surprise, after initial groundwork to develop relationships, I was met with a cohort of emergency response commanders who were willing and eager to collaborate. Indeed, the incidents that were described in the interviews that were conducted for this thesis were more detailed and introspective than I could have imagined. I am honoured that I was provided with the opportunity to listen to the experiences of these heroic men and women first-hand. Furthermore, commanders showed a great enthusiasm to continue their professional development and to learn about the psychology of decision making, which made it a hugely rewarding process. This provides a positive outlook for the use of psychology to help train decision making in emergency service contexts and the potential for further collaboration in the future.

This thesis stresses the important concept of ‘resilience’. As is echoed throughout this thesis, emergency incidents are inherently complex, dangerous and high-stakes. Not only is there a high level of risk for the public, but for the emergency responders themselves. Before they even arrive, commanders are faced with a demanding situation over which they have little initial control. The training to enable commanders to develop a resilient response to emergencies is essential in order to facilitate expertise and increase awareness of appropriate goal orientations and cognitive processing styles. As will be recommended, a greater understanding of roles and responsibilities across a decentralised network of emergency response teams could facilitate decision making. Indeed, the desire of the government’s Joint Emergency Services Interoperability Programme (JESIP) to develop ‘joint’ decision making during emergencies, defined by collective and mutual agreement, is not

necessarily the most adaptive way to facilitate inter-agency working. Instead, based on findings from this thesis and the wider literature, it is suggested that a focus on developing an understanding of the nuanced differences in skills and capabilities between agencies is more appropriate. A decentralised approach to emergency responding would create a resilient network to enshrine expertise.

A key personal reflection on this thesis steps outside of the domain of pure psychology and reflects a contextual, and somewhat political, observation. A key motivator during my time as a PhD researcher has been to ground my data in the context of the real-world environment, and to listen to what emergency response commanders had to say. As such, it was important to pay great attention to the topics that commanders wished to talk about. As with all NDM projects this is perhaps what makes them one of the most exciting and rewarding research pathways to undertake. It would be remittent of me not to mention a major theme that was identified in Chapter 5; a theme that not only contributes to the inherent complexity already acknowledged in the emergency domain, but one that also limits the basic resilience of the emergency services to respond: the negative impact that budget cuts and austerity have had on the ability to respond. Although a discussion of this may be more aligned to a thesis on politics, the impact that such cuts have had on the *psychology* of emergency responding is plain to see. Commanders described how budget cuts had exacerbated endogenous challenges by stripping resources and creating added pressure with regards to financial expense, and further inhibited exogenous team processing by increasing competition and blurring professional boundaries. Moreover, the psychological strain this is having on emergency service workers both in terms of their own mental wellbeing and on their ability to make decisions when trading-off these hugely aversive factors is startling.

The UK is currently in a state of crisis with the emergency services. Budget cuts have rapidly diminished resilience within the UK to respond to crisis incidents. The importance of the emergency services is clear: they are the foundation to a resilient society upon whom we rely on the most in times of need. The commanders who lead these teams are fallible human beings and the complexity of the emergency incident environment makes decision making challenging. Evidence from this thesis suggests that decision making is most at risk, not due to choice outcomes, but due to the *inability* to make a choice at all. This arises due to the process of *decision inertia*, the

redundant deliberation of options for no positive gain, which appears to be associated to goal conflict when considering multiple alternatives, and is exacerbated by the anticipation of negative outcomes, including those linked to the salient impact of budget cuts and austerity. Yet this pessimistic outlook is not inevitable and steps can be made to reduce inert processing. First and foremost by investing in an emergency service that embraces expertise. By empowering response agencies to work, not jointly, but collectively through collaborative expertise and by training commanders to develop cognitive processing strategies to facilitate decisive action. It is hoped that the publication of research to identify the importance of resilience will help to protect the emergency services and provide a psychological safety net against future emergencies.

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Chapter 1: The conceptual importance of the psychology of inaction: an overview of what is known and the questions that remain

1.1 Introduction

The Boxing Day Tsunami (2004), the Haiti Earthquake (2010) and the widespread and repeated flooding disasters that have hit the UK in recent years; all extremely diverse and emotionally salient emergencies that have one thing in common: the failure of authorities to take timely action (Grunewald, Binder & Georges, 2010; National Audit Office, 2006; PEDU, 2012; UNICEF, 2008). This thesis makes a novel contribution to psychological theory by extending upon the limited research on the psychology of doing nothing. Specifically, it will explore this concept within the domain of extreme decision making and the emergency services. It will describe why individuals sometimes fail to take action, despite their desire to make a choice, by investigating the psychological phenomenon of ‘decision inertia’. Decision inertia is a cognitively active process that involves the continual, yet fundamentally redundant, deliberation on a choice for no positive gain. It is distinct from decision avoidance, whereby individuals are motivated to *disengage* with the decision process by choosing to defer or ignore it, as decision makers *intend* to make a decision through the constant reassessment of the problem. The concept of inertia has developed over a number of years, based on anecdotal evidence and research working within the domain of critical incident decision making at the Centre for Critical and Major Incident Psychology, University of Liverpool. This thesis seeks to further define the concept of decision inertia through research.

Data was collected from representatives of the UK Emergency Services; namely the Police Service (PS), Fire and Rescue Service (FRS) and Ambulance Service (AS). The types of decisions that were of interest to research were those at risk of deliberation. As such, ‘command’ level participants were sought (i.e. those who have responsibilities to take ‘charge’ at an incident) because their decisions are strategic, high-stakes, involve multiple contributory factors and have the potential for creating a long-term impact that can far outlast the decision event. For example, the choices made by Chief Superintendent David Duckenfield at the Hillsborough Football stadium disaster in 1989, where 96 Liverpool Football Club fans were crushed to death, are still being unpicked in court 26 years later. Command-level choices are

also compounded by the social setting, as commanders often operate within multi-agency environments involving coordination with other ‘blue lights’, local or national authorities. This adds further social complexity to decision making as commanders must not only consider their own intra-team goals but also those of inter-team members, which at times may be contradictory. The theoretical aim of this thesis was to expand the psychological understanding of decision inertia. The introductory chapter will firstly outline the psychological literature that has informed this research. It will:

- (i) Define decision making
- (ii) Describe the history of decision making research by outlining:
 - a. The progression of early decision making research from *prescriptive* to more *descriptive* models
 - b. The distinction between two modern approaches to research: *decision-making* research (largely *prescriptive* with a focus on right and wrong decisions); and *problem-solving* research (largely *descriptive* with a focus on how choice problems are cognitively processed)
- (iii) Focus on the research domain of interest: the challenges to decision making in extreme environments
- (iv) Provide a description of the research context: the UK emergency services

1.2 Defining decision making

1.2.1 What is decision making?

Decision making is the process of choosing an action in order to achieve a goal in an uncertain environment (Hastie, 2001). It is a psychological process that links cognition and emotion as individuals use both emotional and rational weights to help guide the decision process (Bechara, Damasio & Damasio, 2000). People make hundreds, if not thousands, of decisions each day, ranging from small, everyday decisions with small and short-term consequences (e.g. decision to have cereal for breakfast) to more complex choices with large and long-lasting implications (e.g. decision to get married). Decisions can vary depending upon their social context: such as individual decisions within organisational or work domain (e.g. a doctor’s

diagnosis of a patient) or involve joint or team-based choice where decision making autonomy is shared (e.g. marketing team's decision on when to launch a new product). The goal of any choice is to select an option that is most appropriate for dealing with the situation at hand. Importantly, a decision is not a *preference* to act in a certain way, but the *commitment* to implement a specific action. Preferences can *influence* the generation of certain options and reflect a general tendency or likelihood to favour a certain option, but they are not rigid or certain and may be traded-off against other salient and relevant factors of the choice context. For example, someone hosting a dinner party may *prefer* to cook meat and thus have a *tendency* to consider meat-based dishes, however, if they had invited a vegetarian guest to dinner then then *preference-based choice* options would be overruled and the decision maker must consider wider options to align with the requirements of the decision task. A decision is thus more than an intention to take a particular option or course of action; a decision is the final cognitive commitment to behaviourally execute a choice that aligns with one's, often multi-layered and competing, goals.

1.2.2 The decision making process

Most of the decision making models that are outlined in the psychological literature follow a relatively similar process path. Generally, decision makers will try to understand the situation and build *situation awareness*, they will then generate and/or identify their available *options* that are relevant to the decision task, whilst further attempting to *evaluate* the appropriateness of these options relevant to their goals, and finally they will select and *execute* their final choice (Fellows, 2004; van den Heuvel, Alison & Crego, 2012). For example, a person who is seeking to buy a house will first gather their general information about the housing market (*situation awareness*), they will then identify their potential *options* that are relevant to their requirements (i.e. available houses) and generate additional options to accommodate contingencies (e.g. wait save a larger deposit to get a bigger property), options will then be *evaluated* according to the house buyers' salient goals (i.e. affordability of property, number of bedrooms) and a final decision made on *action* (i.e. buy property or postpone to save a larger deposit). Although this process may not necessarily follow a linear structure, with iterative updates and revaluation along the way, most decision making will involve situation assessment, option generation and evaluation and final action.

In describing this process in more detail, situation assessments are derived through ‘sensemaking’ (Schatz, Dolletski-Lazer & Colombo, 2011): the interaction between sensation (i.e. the detection of external stimuli based on innate abilities such as eyesight; Baddeley, Hitch & Allen, 2009) and perception (i.e. the adaptable and dynamic skills an individual holds in interpreting sensations to make conclusions about the environment; Smith, 2002). Sensemaking (and subsequent situation awareness) differs between individuals based upon their *innate* perceptual abilities and interaction with the *skills* they have for perceiving relevant cues and information. For example, someone who is deaf may be unable to hear a conversation, yet have perceptual skills in lip reading. This would mean that they continue to make sense of their environment through the interaction between sensation and perception, despite limitations in innate abilities. Establishing one’s awareness of the situation is thus the first step in the decision making process; yet it may vary greatly based upon the innate abilities and developed skills of different individuals.

The second phase of decision making, option generation and evaluation, may also differ between individuals. This is due to the use of different analytic techniques and cognitive processing styles. When faced with a decision, individuals generally tend to use one of two types of processing styles: using analytic and structured evaluation of options (e.g. follow a sub-decision check list), or more intuitive techniques (Jenkins, Stanton, Salmon, Walker & Rafferty, 2009). Research on cognitive processing and the evaluation of options has paid a great deal of focus to the study of expertise. For example, the recognition primed decision making (RPD) model describes how individuals who are experienced in a decision domain can intuitively recognise the situation based upon subtle cues within a learned environment (Baber, Fulthorpe, & Houghton, 2010; Klein, 1998). This enables experts to expedite the decision making process as they can almost automatically generate and select the most appropriate option without the need for systematic and conscious evaluation of the situation (Klein, Wolf, Militellio & Zsombok, 1995). Indeed, whereas the decision making processes has been described in a relatively linear way, it appears that experts use their adept skills in sensemaking to take rapid actions and expedite the decision process. Experts are excellent sensemakers due to their advanced perceptual abilities, which enable them to make rapid decisions based

upon scarce perceptual knowledge (Gobet & Chassy, 2008; 2009). Indeed, experts can ‘leap’ or ‘shunt’ along the decision making process, whereas novices take more time to follow a linear and analytic decision making pathway (Jenkins, et al., 2009). Once a decision maker has successfully progressed through situation assessment, plan formulation and option evaluation, they must then commit to their choice through behavioural execution.

1.3 History of decision making research

Traditionally, decision making research can be split into two types: (i) research that seeks to provide *descriptive* models that *explain* the process of decision making; and (ii) research that seeks to provide *prescriptive* models that identify the requirements for *good* decision making under normative standards (Katsikopoulos & Lan, 2011). Both approaches have helped psychologists to describe the general process of decision making and, as will be discussed, have converged over recent years to inform more pluralistic approaches. This next section will outline the early psychological research, which took a largely prescriptive approach in identifying the conditions under which decision making deviated from rational and normative standards. It will then introduce more pluralistic and recent research, which is oriented more favourably towards descriptive ideologies in order to not only identify the conditions under which rationality is flawed, but further to describe the cognitive processes associated with adaptive choice.

1.3.1 Early psychological research on decision making

One of the earliest psychological theories on decision making was the purely rational and *prescriptive* model of Expected Utility Theory (EUT) (von Neumann & Morgenstern, 1947). According to EUT, decision makers consistently seek to maximise their utility (i.e. outcomes) and will try to achieve this via the rational calculation of their *expected* (i.e. anticipated) utility. A rational decision maker will always be able to pick the optimum option providing that they select an option that will lead to the greatest expected utility/gain; a principle which has been readily applied to economics (Kahneman, 2003). EUT governs that rational choices are governed by six axioms, which ensure optimal decision making (Plous, 1993). They are: (i) the hierarchical ordering of alternatives (so that they may pick the best), (ii) identification of dominance (so that they pick the most dominant option), (iii) the

principle of cancellation (they will only compare alternatives on *differing* attributes), (iv) applying rules of transitivity (an awareness that if $A > B$, $B > C$, then $A > C$), (v) using continuity (will select an optimising gamble over a sure gain); and (vi) maintaining invariance (they remain unaffected by framing effects). In extending this model, Savage (1954) added a subjective component (i.e. Subjective Expected Utility Theory), which allowed for rational decision making in the absence of objective probability by incorporating subjective judgements as weights in decision making. Fundamentally, utility theories assume that decision making will be optimised by using rational cognitive processing styles.

Although prescriptive models are useful for identifying *ideal* decision making when operating in objective environments whereby the ability to calculate outcomes is available, decision making in the real-world rarely offers this opportunity (Baron, 2008; Simon, 1956). As such, the ecological validity of prescriptive decision making models that identify how decisions *ought* to be made is limited. It has been found that people often violate many of the rational principles identified by utility theories when making choices in uncertain contexts (e.g. Kahneman & Tversky, 1979). Although rational models may facilitate decision making in non-time pressured and low complexity environments, when decision making is ambiguous then individuals will try and reduce the need for cognitive processing by using, for example, cognitive heuristics and biases, which can degrade decision outcomes (Kahneman & Tversky, 1979). For example, people regularly violate the 'cancellation principle' (i.e. one should only compare options on differing attributes) when given real-world choices and compare different options on equivocal attributes (Allias, 1953; Ellsberg, 1961). Furthermore, decision makers rarely hold consistent hierarchal ordering of options as they are often unstable and altered according to dynamic and changing preferences during the decision process (Tversky, Slovic & Kahneman, 1990). Thus, prescriptive decision making theories may be useful for understanding logical and rational processes, but have limited application to understanding how people actually make decisions in the real-world (Baron, 2008; Simon, 1956).

In response to the criticisms levelled at prescriptive models, Simon (1956) combined descriptive and prescriptive approaches. He acknowledged that real-world choices were often flawed and sought to *describe* the cognitive processes that led to

deviations from prescriptive standards (Katsikopoulos & Lan, 2011). His theory of *bounded* rationality acknowledged that pure rationality of choice is generally unobtainable in the real-world due to both environmental and cognitive constraints in human cognition. For example, the presence of time pressure (an environmental stressor) can alter the way an individual will cognitively process their choice. When placed under time pressure, individuals tend to avoid the analytic (and slower time) evaluation of options, as they need to adapt to time pressure and take fast action (Alison, Doran, Long, Power & Humphrey, 2013; Kocher & Sutter, 2006). Time pressure further tends to limit the amount of information that individuals consider at one time due to constraints on working memory capacity (Galotti, 2007). Individuals use limited processing strategies such as satisficing (select option which satisfies most important needs), elimination-by-aspects (eliminate options until only one left), and adequacy criterion (choose first option to fill criteria) in order to cope with the additional cognitive load contributed to time pressure (Alison, Doran et al., 2013; Kahneman & Tversky, 1979; Simon, 1956). Thus, despite the *prescriptive* relevance of rational decision making models to further the understanding of how decision making can be optimised, their *descriptive* ecological validity to real-world decision making is limited as decision making is so often bounded by cognitive constraints.

In extending Simon's work, Kahneman and Tversky (1979; 1984) looked more specifically at how individuals adapt their cognitive processing in order to try and cope with environmental and cognitive constraints, concluding that humans are relatively poor decision makers who often use biased, poor or faulty judgements. They developed a model of 'Prospect Theory', which outlines how individuals tend to ignore decision outcomes when they are faced with a risky choice (thus violating the principles of EUT), and instead use *irrational* cognitive biases that focus on avoiding the emotionally salient and negative impact of losing (Kahneman, 2003). For example, *loss aversion* describes the overwhelming preference to take high-risk gambles in order to avoid loss completely, than to suffer a certain but smaller loss, even when the normative option is the latter (Tversky & Kahneman, 1992). Similarly, the sunk-cost effect describes how individuals tend to irrationally continue their investment into a revealing inferior endeavour (e.g. stocks) rather than cut their losses, due to the negative emotions associated with having wasted previously

invested resources (Arkes & Ayton, 1999; Dawes, 1988). It appears that people use cognitive biases in order to avoid the more systematic processing of information by basing their decisions, not on anticipated outcomes, but on general biased preferences for certain types of options.

In addition to cognitive biases, people also tend to use irrational *heuristics* (i.e. simple adaptable rules to reduce systematic processing of choice and speed up the decision process) when making decisions under environmental and cognitive constraints (Tversky & Kahneman, 1979; Reimer, Mata & Stoecklin, 2004). The ‘availability’ heuristic describes how individuals tend to assume that when something is easy to retrieve from memory then it is frequently occurring (Tversky & Kahneman, 1979). It is linked to the ‘recency effect’, which describes how recently encoded information is more easily retrieved in memory; creating an irrational assumption of increased prevalence (Hertwig, Pachur & Kurzenhauser, 2005). Likewise the ‘representative’ heuristic describes how people tend to assume high commonality between options that are prototypically similar to one another (Kellogg, 1995) and is often linked to confirmation bias, whereby individuals seek out information to confirm their (irrational) assumptions rather than discover objective truths (Lord, Ross & Lepper, 1979). The use of heuristics has been found to increase in situations that are time pressured (Kruglanski & Thompson, 1999), ambiguous (Souchon, Cabagno, Traclet et al, 2009) and cognitively overloading (Renkl, Hilbert & Schworm, 2008). As with cognitive biases, they override more analytic and rational decision processing and can lead to extremely poor choice outcomes (DiBonaventura & Chapman, 2008).

Although research on heuristics and biases takes a largely negative approach in exploring *deviations* from ideal and *poor* decision making, heuristic processing can also facilitate *adaptive* choice (Gigerenzer, 1996; Goldstein & Gigerenzer, 2002; Oppenheimer, 2004). This more ecological approach to human cognition extends and criticises the narrow scope of previous research on heuristics (Gigerenzer, 1996) and suggests that environmental factors can influence cognitive processing in a positive way (Campitelli & Gobet, 2010) by triggering the use of ‘fast and frugal’ heuristics (Gigerenzer 1996; Goldstein & Gigerenzer 2002). Heuristics can be usefully applied to aid the rapid (and accurate) processing of limited information (Todd & Gigerenzer, 2007). For example, both the fast and frugal *recognition* heuristic and

the biased *availability* heuristic share a mutual assumption that individuals tend to select options that are most salient in memory when choosing between alternatives (Tversky & Kahneman, 1979; Goldstein & Gigerenzer, 2002). Yet, whereas the heuristic and biases approach would suggest that this process is *biased*, the fast and frugal approach suggests that recognition is both *useful* and appropriate and can lead to accurate choices (Goldstein & Gigerenzer, 2002). The use of fast and frugal cognitive shortcuts can help individuals to cope with environmental stressors (such as time pressure) as they provide time-efficient strategies such as ‘take the best’ or ‘satisficing’ (Alison, Doran, et al., 2013; Pachur & Hertwig, 2006; Todd & Gigerenzer, 2007). Indeed, experts often use accurate intuitive strategies that enable efficient decision making despite environmental constraints (Gobet & Chassy, 2008; 2009; Klein, 1998; Jenkins et al., 2009). It is important to note however that ‘fast and frugal’ heuristics may thus be contingent upon a level of expertise in the decision domain in order to be effective (Richter & Spath, 2006).

Decision making research has thus progressed through a number of paradigm shifts. It has developed from the study of idealistic models of pure rationality and expected utility and acknowledged that real-world information processing is often constrained by environmental and cognitive limitations. Such constraints cause decision makers to limit their analytic processing by using cognitive biases and heuristic shortcuts. Although these short-cuts can reduce cognitive load on the decision maker, they also risk the increase of decision error, especially when operating in complex environments. Positively, however, more recent research has highlighted how ‘fast and frugal’ heuristics may also aid adaptive and efficient decision making, especially when the decision maker has expertise in the decision domain. This chapter will now discuss more recent advances in decision making research. It will identify two approaches to decision making research by distinguishing between ‘decision making research’, which takes a largely prescriptive approach to identify the conditions under which individuals make good or bad choices, and ‘problem solving research’, which takes a more descriptive approach in exploring how individuals solve problems in the real-world (Patel, Kaufman & Arocha, 2002).

1.3.2 Two modern approaches to research: ‘decision making’ versus ‘problem solving’ paradigms

According to Patel et al., (2002), psychologists who are interested in the study of choice behaviour can be divided into two types: those interested in ‘decision making’ and those interested in ‘problem solving’. Decision making researchers take a largely *prescriptive* approach as they seek to identify the conditions under which individuals may deviate from normative standards (i.e. focus on how decisions *ought* to be made); whereas problem solving researchers take a more *descriptive* approach to understand the cognitive processes that people use to solve whole decision problems (i.e. focus on the *process* of a decision rather than the outcome) (Patel, et al., 2002). Research on cognitive biases and heuristics (e.g. Tversky & Kahneman, 1979) are examples of *decision making* research as researchers seek to test the conditions under which decision makers deviate from normative standards, offering the potential to *improve* choice via interventions (Chapman & Elstein, 2000). For example, Poon, Koheler and Buehler (2014) found that people use irrational heuristic judgements to estimate the likelihood that they will undertake positive behaviours such as giving blood, consistently underestimating situational barriers to action (e.g. too busy), and overestimating the likelihood that they will commit to their intentions, even when interventions were put in place to make situational barriers more salient. *Decision making research* explores the conditions under which individuals may deviate from normative or rational decision making standards: it focusses on the *outcome* of choice.

Alternatively, *problem solving research* is less concerned with the outcome of choice (i.e. whether the individual gave blood or not) and instead seeks to understand the process that individuals undertake when deciding whether to give blood or not. Rather than focus on discrete decision tasks in closed-choice environments, it explores the cognitive processes that individuals use when faced with wide and dynamic choice problem. For example, whereas decision making researchers utilise methodologies such as vignettes and decision problems that present a specific and singular *decision* with discrete options (e.g. will you give blood or not?), problem solving researchers use real-world methodologies to present more open and deliberative decision making *problems* from which individuals may generate their own solutions (e.g. There is a shortage of blood donation in your local area. How

will you solve this problem?). The presentation of problems, rather than discrete decision tasks, thus facilitates a more *descriptive* model of how individuals (and teams) process problems in the real-world.

As this thesis sought to investigate the concept of decision inertia in the real-world, it can be classified within the problem-solving approach to research. Specifically, research was inspired by the ‘Naturalistic Decision Making’ (NDM) framework, which seeks to understand how people operate and cope with decision problems within specialised and real-world decision making domains (see Chapter 2 for further details). For example, NDM studies have been used to identify how elite sport athletes are able to manage their time under conditions of fatigue and stress (Macquet & Skalej, 2015), and how information technology may (or may not) be usefully applied to facilitate military pararescue (Millitello, Sushereba, Branlat, Bean & Finmore, 2015). Rather than focus on prescriptive discussions on ‘right’ and ‘wrong’ decision making, NDM seeks to understand choice implementation ‘in the wild’ (Gore, Banks, Millward & Kyraikidou, 2006; McAndrew & Gore, 2015). It is interested in how people solve problems in the real-world, which may in turn provide insights into how one may train their decision making or develop technology that could facilitate problem solving (Millitello et al., 2015). An example of how NDM has facilitated problem solving in the real-world is in the identification the importance of ‘macrocognition’ in team settings (Hutchins & Kendall, 2011). A focus on macrocognition, as opposed to discrete cognitive functions (e.g. attention, memory), facilitates the study of problem-solving as it offers a wider perspective on how people solve problems and make decisions in the real-world. This descriptive, problem-solving approach aligns with the scope of this thesis: to explore how commanders within the emergency services solve decision problems that arise during real-world major emergencies. This chapter will now provide a more detailed description of the research domain being studied in this thesis: problem solving in extreme environments.

1.4 Problem solving in extreme environments

Emergency incidents are extreme environments: contexts in which individuals and teams must make judgements whilst operating under rapidly changing and uncertain conditions (Millitello, et al., 2015). Examples of extreme environments may

include survival in arctic weather, military activity in warzones or firefighting in a burning building. They test an individual's ability to perform by limiting their cognitive functioning capacities whilst stretching their physical, psychological and interpersonal skills (Orasanu & Lieberman, 2011). Decision making in such environments is crucial to ensure that all those involved can survive these extremes; yet evidence from the real-world indicates that decision making within these settings is not always appropriate. For example, a report commissioned by the UK Cabinet Office, which examined 32 major incidents that occurred in the UK in the 1980s, 90s and 00s, identified how failures to take action were linked to poor decision making and impeded 'interoperability', defined as *"the extent to which organisations can work together coherently as a matter of course"* (p. 8, Pollock, 2013). Furthermore, when analysing the 2011 Fukushima nuclear disaster, Japan's Nuclear Accident Independent Investigation Commission emphasized how *"delays in taking action contributed to the inappropriate response seen during the accident"* (p.38, Kurokawa, 2012). Thus, the failure to take action when operating in extreme environments is hugely detrimental, yet exceptionally prevalent during emergency response disasters (Alison, Power, van den Heuvel, Humann, Palasinski & Crego, 2015). Importantly, real-world reports do not contribute failures to deviations from *correct* decision making in extreme environments, but on the *timeliness* of action and the failures of emergency responders to take any action at all. As the physical challenges associated with extreme environments are not related to cognition, this chapter will discuss how psychological (i.e. uncertainty) and interpersonal (i.e. team) skills may be stretched in such domains (Orasanu & Liberman, 2011).

1.4.1 Challenges to psychological skills in extreme environments: the role of uncertainty

Decision making in emergency response settings is inherently uncertain (Alison & Crego, 2007). Uncertainty is defined as *"a sense of doubt that blocks or delays action"* (p.150, Lipshitz & Strauss, 1997). It is a subjective experience that results from trying to process missing, unreliable, conflicting or complex information (Klein, 1998) and is associated with having an inadequate understanding of the situation, incomplete information and difficulty in differentiating between options (Lipshitz & Strauss, 1997). Uncertainty is linked to the perception of risk (Bernstein, 1998) and can derail the decision making process, causing individuals and teams to

defer choice and/or focus on redundant information that will not inform their choice (Alison, et al., 2015; van den Heuvel, et al., 2012). Indeed, individuals often try and cope with uncertainty by using more intuitive processing (Kahneman & Frederick, 2002). Instead of rationally processing their choice, they use intuitive ‘cognitive biases’ (i.e. innate preferences for certain options) and inappropriate ‘heuristics’ (i.e. simple decision rules/formulas) that degrade the decision outcome (Tversky & Kahneman, 1979). As extreme environments are rapidly changing and dynamic events that are inherently uncertain (Orasanu & Lieberman, 2011), it is important that steps are taken to try and reduce uncertainty and enable decision makers to process the task environment. The impact of uncertainty on decision making in extreme environments is a key focus of NDM in order to generate an understanding of the cognitive processes that may be used to overcome ambiguous effects (Alison, et al., 2015; Orasanu & Lieberman, 2011).

Positively, a large body of NDM research has identified how skilled (or ‘expert’) decision makers are able to utilise accurate intuitive processing based upon adaptive cognitive shortcuts that have been learned via repeated practice of decision making within the decision domain (Kahneman & Klein, 2009). For example, a study on police decision making describes how police tend to cope with uncertainty by using adaptive cognitive shortcuts associated to the *RAWFS* heuristic; namely by *Reducing* uncertainty via information search, using *Assumption-based reasoning* to fill information gaps, *Weighing pros and cons* to compare options, *Forestalling* in preparation for worst case scenarios, and *Suppressing* uncertainty to prevent its negative effects (Lipshitz & Strauss, 1997; van den Heuvel, Alison & Power, 2014). Experts also use *Reflection-in-action* (Schon, 1983) as an uncertainty reducing coping mechanism in order to heuristically self-monitor and iteratively update their understanding of an ongoing problem incident (van den Heuvel, et al., 2014). As discussed earlier, the RPD model also describes how experts can rapidly and intuitively respond to crises via expert recognition based on implicit cognition (Klein, 1998) and further research has described how experts are able to expedite the decision making process in complex and uncertain environments by ‘leaps’ and ‘shunts’ along the decision process (Jenkins et al., 2009). Thus, although decision making in extreme environments may be inherently uncertain, it is possible that training to facilitate the development of accurate intuitive expertise and / or

technology to expedite analytic processing may overcome these negative effects (Millitello et al., 2015).

However, importantly, the sole focus on uncertainty reduction in extreme environments may not always be the best strategy for improving decision making. As discussed, decision inertia describes how decision makers in extreme environments try to *irrationally* reduce uncertainty via the redundant deliberation of information, despite there being low or no probability of further useful information arising. This implies that an over-focus on uncertainty reduction in extreme settings may inadvertently worsen decision making. Indeed, decision inertia is an inverse heuristic process linked to the failure to take action as a result of *increased* cognitive deliberation; decision makers irrationally focus on reducing uncertainty as opposed to implementing choice. This raises an important question on whether technological developments to reduce uncertainty in extreme environments are appropriate. Indeed, Millitello et al., (2015) suggested that the time-pressured nature of extreme environments meant that technology to reduce uncertainty was not always desirable, nor appropriate. An overemphasis on uncertainty reduction may distract individuals from the more pressing requirement to make decisions in good time. Thus, it is possible that interventions that focus on the psychological processes associated with expertise may be *more* appropriate than the development of technology to reduce uncertainty in extreme environments.

1.4.2 Challenges to interpersonal skills in extreme environments: the role of teams

Extreme environments not only test the psychological skills of decision makers, but further place great pressure on interpersonal skills when operating in teams (Orasanu & Lierberman, 2011). By their very nature, extreme environments commonly involve team-based choice. For example, decision making during emergency incidents will involve decision making at various intra-team levels (within each agency) and collective decision making at the inter-team levels (between agencies). As outlined above, uncertainty can derail decision making at the psychological level due to information complexities in the problem domain (Alison, et al., 2015; van den Heuvel, et al., 2012). Thus, uncertainty associated with the decision task will further permeate team-based processing. A study exploring the

impact of uncertainty in high-stakes emergency response teams found that team-based uncertainty was more common than uncertainty associated to the task (Alison, Power, van den Heuvel & Waring, 2014); 75% of uncertainty was contributed to social and team management problems (exogenous uncertainty) compared to just 25% contributed to the task environment (endogenous uncertainty). This suggests that, although situational complexities can impede decision making, that uncertainty related to social complexities within the decision making team can have a greater negative impact on overall uncertainty.

In order to try and improve team coordination during emergency incidents, it has been suggested that decision making may improve if team members and sub-teams were more 'interoperable' (Pollock, 2013). Joint-coordination and 'interoperability' are both key features of emergency response command teams (House, Power & Alison, 2014). It is based on the assumption that extreme emergency environments require a collaborative response from different agencies as the required knowledge to respond to the incident moves beyond an individual emergency response agency (von Lubitz, Beakley & Patricelli, 2008). For example, the response to a major bridge collapse would require close collaboration between all three blue light services in order to police the incident, rescue casualties and treat patients. Yet interoperability is often limited in the real-world as team members and sub-teams fail to understand the roles, responsibilities, goals and intentions of other team members (Perry & Wears, 2011; Pollock, 2013). This can lead to inter-team coordination failures as team members are unaware of one another's skills and so operate in silos. Team decision making effectiveness is reduced when there is a poor understanding of distributed roles and responsibilities across the team network; a lack of knowledge about one another's roles can induce erroneous expectations about other team members' capabilities and responsibilities to perform certain tasks (Alison, et al., 2014). Not only may this impede task completion due to assumptions that other team members are responsible, but it can also lead to competition between team members who may try and contend for dominance or primacy over the decision task (Brehmer, 1987). A lack of awareness on one's own and other's place in the multi-team system can degrade team decision making in extreme environments by adding to uncertainty.

The valence of interpersonal relationships and trust in multi-team settings can also influence the experience of uncertainty in extreme environments. Trust is the shared assumption by two individuals / organisations that the advice provided by another is reliable (Rotter, 1980). Trust can improve decision making in high-risk settings by enabling faster decisions and actions (Das & Teng, 2004). Trust in team settings is beneficial as it encourages positive self-regulation practices and commitment to collective goals (Bishop, Scott & Burroughs, 2000; Millward, Banks & Riga, 2010). When collective strategic goals are explicitly outlined in multi-team settings, then it facilitates cohesive action towards a shared ideal, which can increase collective action (Alison, et al., 2015). Yet, when individuals are uncertain about whether they can trust other team members then this can negatively impact upon team coordination. Poor trust can increase cognitive load on the individual as they try and take on additional tasks in place of the distrusted other, which increases cognitive load in an already demanding setting (Alison, et al., 2014). For example, if a commander lacks trust in a member of their command support team, they may overload themselves by taking on additional tasks, or inappropriately overload other members of their team by giving them additional tasks. The ability to build trust in emergency response settings is also limited, as inter-team members may rarely operate with one another on a regular basis. Trust in such settings must develop at a temporary level, based upon cognitive trust in another's ability to perform their role (McAllister, 1995; Meyerson, Weick & Kramer, 1996). Both trust and role understanding are positively related to one another (Dirks & Ferrin, 2001) and help to facilitate interpersonal skills in extreme environments. The remainder of this introductory chapter will seek to more specifically outline the extreme environment in which research for this thesis was conducted: emergency responding.

1.5 Emergency response decision making

This chapter has so far provided a general overview of the available literature on decision making; specifically within the context of extreme environments. It has outlined general decision making theory and described the progressive paradigm shift from prescriptive models of rationality and expected utility theory (von Neumann & Morgenstern, 1947) to the more descriptive models of bounded cognition (Simon, 1956), heuristics and biases (Kahneman & Tversky, 1979), fast and frugal heuristic shortcuts (Gigerenzer, 1996; Goldstein & Gigerenzer, 2002;

Oppenheimer, 2004) and expertise (Klein, 1998). It has distinguished between two modern-day approaches to research: (i) ‘decision making research’, which focuses on the circumstances under which individuals deviate from normative standards (i.e. heuristics, biases); and (ii) ‘problem solving research’, which takes a wider approach to describe the cognitive processes related to real-world reasoning (Patel et al., 2002). More specifically, it has identified a relatively new frontier of problem solving research: cognitive processing in extreme environments (Militello, et al., 2015; Orasanu & Lieberman, 2011). Thus, as this thesis utilises NDM methods to explore problem solving in the real-world, extreme environment of UK emergency responding, it is important to now describe the organisational characteristics of this specialised environment.

1.5.1 Emergency responding in the UK

According to the Civil Contingencies Act (2004), an emergency is defined as any event, situation, or act of war or terrorism which threatens serious damage to human welfare, the environment or the security of the United Kingdom. An emergency is classed as a major incident if it’s “*impact cannot be handled within routine service arrangements*” (p. 12, Department of Health, 2005). According to the Department of Health (2005), it can arise due to the following scenarios: (i) big bang (serious accident/explosion); (ii) rising tide (developing infectious disease/staffing crisis); (iii) cloud on the horizon (serious threat developing elsewhere with need to prepare); (iv) headline news (public/media alarm); (v) internal incidents (fire, equipment failure); (vi) release of chemical, biological, radiological, nuclear or explosive materials (CBRNE); (vii) mass casualties; or (viii) pre-planned major event (demonstrations, sports). Major incidents require the implementation of special procedures that involve representatives from two or more of the emergency services. They are characterised by the potential for mass casualty, crowds, demanding public enquires (both media and general public), and/or coordinated response and organisation of emergency services and supporting organisations (Civil Contingencies Act, 2004). Between 1966 and 1996, there was on average between 3-4 major incidents occurring in the UK every year (Mackway-Jones, 2005). Recent examples of major incidents in the UK include the mass-shootings in Cumbria by lone gunman Derrick Bird (Chesterman, 2011) and the widespread flooding that hit parts of Somerset and the wider UK coastal regions in

2013/14 (Morris, 2014). Major incidents may arise suddenly and require a short active ‘response’ phase (e.g. pursuit of Derrick Bird) or be more long-term and continue over the course of many weeks and months (e.g. flooding).

When an emergency occurs in the UK, it is the responsibility of ‘Category one’ responders to assess the overall risk of the incident, plan a response and deal with the emergency (Civil Contingencies Act, 2004). Category one responders include local authorities (local councils), emergency services (police and fire) and health services (ambulance, hospital). Category two responders are also required to be involved in incident response, but hold a more secondary role and whose level of involvement depends upon the specific characteristics of the incident. Category two responders include utilities (electricity, gas, water), transport (airport, harbour, trains), and health and safety (health and safety executive). Both category one and two responders must work together in response to an unfolding major incident and are responsible for the assessment, prevention, preparedness, response and recovery to an emergency (Cabinet Office, 2013). In addition, the military may also be called upon as a last resort; known as Military Aid to Civil Authorities (MACA) (Salmon, Stanton, Jenkins & Walker, 2011).

A major incident can be declared by any category one or two responder if they deem that an incident requires multi-agency liaison and extends beyond the capabilities of the initial response agency. For example, the Fire and Rescue Incident Command Manual states that: *“major incidents may place considerable demands on the resources of the responding organisations, with consequent disruption of day to day activities, and they may have long-term implications for a community or the environment”* (p.16, Fire Service Manual, 2008). Although the declaration of a major incident is usually undertaken by one of the three ‘blue lights’ services (i.e. PS, FRS, AS), non-blue lights agencies (e.g. hospitals) can also declare a major incident and state of emergency. For example, a number of hospitals in the UK have recently declared major incidents due to their inability to cope with increasing demands and pressure on the NHS (Siddique, Bucks, Kirk, Meikle & Campbell, 2015).

When a major incident is declared, it triggers the establishment of a number of command silos that help to structure the emergency response. The command

structure that is used in the UK is known as Integrated Emergency Management (IEM) (Salmon et al. 2011). The IEM approach outlines a hierarchical command from strategic (overall executive command) to tactical (take charge at the scene) to operational (provide main operational response at scene) command levels (DOH, 2005). Up until the recent government-led ‘Joint Emergency Services Interoperability Programme’ (JESIP), which sought to make emergency responding more cohesive, these three levels were referred to as gold (strategic), silver (tactical) and bronze (operational) command (JESIP Doctrine, 2013; Salmon et al. 2011). It is worth noting that, as data was collected during the transition period of this change in terminology, the majority of interviews and quotations used in this thesis refer to the previous bronze, silver, gold system as opposed to the new operational, tactical, strategic terminology (Figure 1.1).

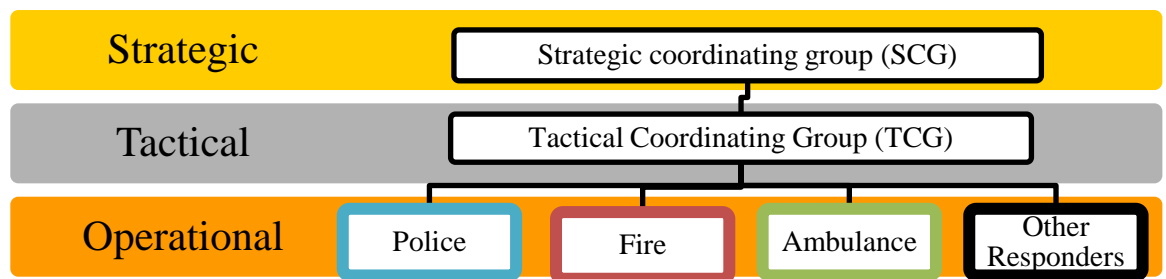


Figure 1.1: Integrated Emergency Management System

At the lowest command level, ‘operational’ commanders from the three blue lights agencies are those located at the emergency incident scene. They have responsibilities to *“control and deploy the resources of their respective service within a functional or geographical area and implement direction provided by the Tactical Commander”* (p.17, JESIP Doctrine, 2013). Depending upon the nature of the incident, there may be multiple operational commanders in charge of multiple sub-teams located in different areas or undertaking different functional roles at any one incident. The second level of command is ‘tactical command’. There is typically only one tactical commander from each agency represented at the ‘tactical coordinating group’ (TCG) and it will involve representatives from all category one agencies, and those relevant from category two. They can be located either on or off-scene depending upon the nature of the incident. For example, a single contained

scene may benefit from having tactical commanders on site, whereas a multi-scene incident with wider impact may be more suited to hosting the TCG at a remote control room. Tactical commanders are responsible for “*consideration of effective joint working with other services and other factors such as access to communications systems*” (p.17, JESIP Doctrine, 2013) and are the conduit between the operational actions being conducted on-scene and the strategic directives that are outlined by the ‘strategic coordinating group’ (SCG). Finally, the SCG consists of strategic commanders (usually ‘Chief’ officers or very senior representatives) from both category one and two responders who are “*responsible for formulating the strategy for the incident*” (p.18, JESIP Doctrine, 2013). Their role is to collectively determine the: (i) aims and objectives of response; (ii) policy framework; (iii) respond to information from tactical commanders (e.g. required increased resources); (iv) respond to media and public communication; and (v) plan for recovery following incident (Ministry of Defence, 2007). Although the police often take charge of the SCG, there is no overall executive authority (Salmon et al. 2011); thus decision making and successful response to multi-agency emergencies is governed by the ability of these strategic commanders to work as a team, and show effective interoperability.

1.5.2 Joint Emergency Services Interoperability Programme (JESIP)

The UK government’s JESIP initiative aims to increase joint working between the three blue lights services in the UK. Interoperability is defined as “*the extent to which organisations can work together coherently as a matter of routine*” (p.2, JESIP Doctrine, 2013). It is based on the assumption that increased interoperability will facilitate more effective emergency responding. The Pollock report (2013), which surveyed 32 major incidents that occurred in the UK over the past 3 decades, identified how failures in effective interoperable and multi-agency coordination led to serious delays in responding. It recommended that improvements in four organisational areas may overcome these effects, which were: (i) cohesive doctrine and organisation; (ii) better operational communications; (iii) shared situational awareness; and (iv) increased joint training and exercising (Pollock, 2013). The JESIP initiative launched alongside training that was provided to all three blue lights agencies that sought to improve five areas where joint standards and operating procedures could facilitate response: (i) co-location on scene; (ii) communication of

timely, relevant and clear information; (iii) co-ordination by integrating response; (iv) joint understanding of risk; and (v) focussing on establishing a shared situational awareness of the evolving incident (JESIP Doctrine, 2013). This will be achieved through training that emphasises the use of ‘acronym-free’ communications and the use of the ‘joint decision making model’ (JDM) to facilitate shared situational awareness and risk perception (Figure 1.2). The JDM was not explicitly tested in this thesis and so detail about this model will not be discussed. However, in brief, it’s purpose is to facilitate joint working, by encouraging all agencies to progress through a shared model of information gathering, risk and strategy assessment, powers and policy consideration, identification of options and contingencies, and action execution; all whilst continually and iteratively considering how this interacts with shared goals to work together, save lives and reduce harm (JESIP, 2013).



Figure 1.2: Joint Decision Making Model (adapted from JESIP Doctrine, 2013)

It is important to acknowledge that increased interoperability may be appealing in theory, but it does not necessarily mean that it will improve decision making in

practice. A recent systematic review on the potential hurdles to interoperability in the UK emergency services highlighted the paradox between the joint desires to foster more horizontal and joint working practices whilst maintaining a vertical integrated emergency management system across operational, tactical and strategic levels (House, et al., 2013). In other words, all three agencies continue to use hierarchical within-agency command structures whilst paradoxically increasing pressure to make joint and collective decisions between-agencies. This contradictory command structure has proved ineffective in other organisations such as healthcare due to the inconsistency between normal working practices, which use vertical hierarchical structures, and the novelty of using less practiced horizontal coordinated systems (Perry & Wears, 2011). Furthermore, *complete* interoperability, whereby all information is shared and interdependent, during a major incident response is unrealistic due to time and cognitive constraints in extreme environments (Bharosa, Lee & Janssen, 2010) as the need for fast action may supersede the time it would take to share information.

Alternatively, a *decentralised* approach to interoperability, which enshrines autonomy and expertise within each agency, may be more appropriate (House et al., 2013). Decentralised networks that maintain harmonious multi-team coordination are central to macrocognition, as both individuals and sub-teams within the wider network have specifically designated tasks and roles that collectively produce efficient behaviour (Hutchins & Kendall, 2011). Rather than a desire for *joint* decision making, it is perhaps more appropriate to facilitate decentralised networks that are characterised by clear role understanding, cohesive goals, interpersonal trust and designated autonomy based on relevant expertise. As the research for this thesis was conducted during the initial introduction of JESIP (i.e., 2012-2014), it provides an intriguing insight into how these changes were perceived by those decision makers it directly affects.

1.6 Thesis aims

This chapter has discussed the psychological foundation to this thesis. The main goal of this thesis was to explore the concept of decision inertia; focussing on the psychology of doing nothing within extreme emergency incident environments. Research was conducted using a *descriptive* approach to *problem-solving* that

utilised *NDM methods*. Findings were derived from an emergent, ground-up approach to data analysis, rather than using top-down theoretical assumptions. It presents a detailed discussion on how *motivations and goal orientations* and the experience of *uncertainty* interact with choice implementation in multi-agency settings. An overview of the main goals and findings of each chapter will now be provided.

Chapter 2 provides an overview of the methodological approach to this thesis. It defines what ‘real-world’ research is and describes the philosophical basis to NDM. It identifies a number of key challenges to real-world research that were identified during data collection. Specifically, these were challenges related to: (i) data access (building and sustaining trusted relationships with practitioners); (ii) data collection (distinguishing between practitioner needs, academic aims and collective goals); and (iii) data analysis (deriving informed and useful conclusions from ‘messy’ data sets). It describes data collection and analyses techniques that were used in this thesis by outlining the ‘Critical Decision Method’ (CDM) as a type of ‘Cognitive Task Analysis’ (CTA), and outlines how modern technology, such as NVivo, can facilitate the qualitative data analysis process.

Chapter 3 provides an in-depth discussion on the concept of decision inertia and failures to act. It outlines how although there is a plethora of research exploring the cognitive processes associated with choice implementation, that there has been a relative paucity of research on the cognitive processing linked to inaction. As this topic is relatively novel it used the ‘Critical Interpretive Synthesis’ procedure: a literature review technique that seeks to generate theoretical insight on novel concepts. Three types of action failure are discussed: ‘decision avoidance’ - the *active* avoidance of choice as individuals opt to disengage with choice, ‘decision inertia’ – the *passive* avoidance of choice through redundant and persistent effortful deliberation between options, and ‘implementation failure’ – the behavioural manifestation of inaction by failure to execute action despite cognitive commitment. It also identifies six theoretical antecedents that may increase the likelihood of inaction: (i) task ambiguity; (ii) social ambiguity; (iii) inexperience in the decision domain; (iv) negative affect; (v) indecisive personalities; and (vi) avoidant goals and motivation. The results of this synthesis provided the theoretical foundation upon which subsequent data chapters were based.

Chapter 4 is the first of two chapters that sought to qualitatively explore the key challenges to command level decision making in the emergency services. CDM – a type of CTA that uses retrospective recall to investigate the cognitive processing of complex choices – was used to interview n=31 command level decision makers from the Police Service (n=12), Fire and Rescue Service (n=15) and Ambulance Service (n=4). Interview transcripts were analysed using an inductive grounded theory approach to contribute to the theoretical understanding of decision inertia. It emerged that a salient challenge to command level decision making was when commanders were required to trade-off competing goals; namely *approach* motivated goals to ‘save life’ against *avoidance* motivated goals to ‘prevent further harm’. Goal conflict arose as commanders were anxious to avoid potential negative consequences, both in the short-term and long-term. Furthermore, negative consequences directly competed with one another, as they were associated to both causing harm through *action* (commission) and harm through *inaction* (omission); leading to redundant cognitive deliberation. Goal conflict arose at individual levels and social team-levels. Recommendations for overcoming these effects through self-awareness and multi-agency training are discussed.

Chapter 5 sought to investigate how different types of uncertainty may interact with decision inertia in emergency incident contexts. A grounded theory approach was once again used to explore the CDM interview transcripts, yet this time with a focus on uncertainty. Support was found for the endogenous-exogenous taxonomy of uncertainty in complex team environments (Alison, et al., 2015). Endogenous uncertainties (relating to the situational characteristics of the emergency incident) were derived from: (i) lacking, ambiguous or too much information; (ii) unreliable or unavailable resources; (iii) time pressure; (iv) social management issues (public and media); and (v) adapting to and coping with budget cuts and austerity. Exogenous uncertainties (associated with team processing) were derived from: (i) communication problems regarding insufficient updating and miscommunication; (ii) poor role understanding, both in terms of own obligations and erroneous expectations on other agencies’ roles; (iii) trust issues associated with distrust, mistrust and a trust paradox; and (iv) competitiveness within the command environment due to competing and conflicting goals. Implications for reducing

exogenous uncertainty by improving team processes, in order to reduce the effects of endogenous factors, are discussed.

Chapter 6 presents data that was collected from an immersive, multi-agency simulation conducted using the ‘Hydra’ simulation system. This chapter took a mixed-methods approach to empirically test some of the conclusions derived from Chapter 4 relating to goals and motivation. In order to supplement the recent classroom training of emergency response agencies, the simulation was of a ‘Marauding Terrorist Firearms Attack’ (MTFA) at a busy city centre train station, where $n=50$ experienced commanders from the three blue lights services were split into 13 multi-agency teams, who each completed the same scenario. Participants were required to ‘log’ their decisions during the simulation in a time-stamped computer system. They also completed a questionnaire after they finished the simulation. It was found that respondents identified six key goals during the incident, of which three were coded as being approach oriented (save life, establish situation awareness, locate/neutralise threat) and three as avoidance oriented (protect wider public from harm; protect emergency responders from harm; prepare for post-incident inquiries). Analyses between agencies indicated that different agencies prioritised different goals, despite perceiving (via Likert ranking) that goals between agencies were consistent. Teams whose members predominantly stated *approach* goals logged *faster* decisions during the initial phases of the simulation, but this effect reversed later into the incident as they took *longer* to make decisions than avoidance oriented teams. It is suggested that although approach goals may facilitate action early on in the incident, that they become maladaptive to decision makers later in the incident, as commanders struggled to trade-off multiple competing tasks that had arisen during the course of the incident. The implications for the usefulness of approach goals in emergency incident contexts are discussed.

Chapter 7 provides empirical investigation of the relationship between the experience of uncertainty and decision making using the questionnaire data collected from the MTFA simulation. A principal component analysis of latent variables exploring the experiential reasons for delay identified three reasons for delay: (i) task uncertainty; (ii) outcome uncertainty; and (iii) reflective uncertainty. Of these, outcome uncertainty was rated significantly higher than both other types of uncertainty. This chapter was also interested in how different cognitive processing

styles may interact with the experience of uncertainty. The questionnaire measured cognitive processing by including two measures: Need for Cognitive Closure (NFC) (Kruglanski et al., 1993) and Cognitive Flexibility (CF) (Denis & Vander Wal, 2010). No significant effects were found between the experience of uncertainty and NFC; however CF did interact. The ‘control’ subscale of the CF inventory (which measures how much ‘control’ one perceives over difficult situations) was positively related to task and retrospective uncertainty; those high on control gave lower ratings of task and retrospective uncertainty. However, interestingly, the ‘alternatives’ subscale of the CF inventory (which measures the ability to consider multiple alternative solutions to difficult problems) was associated with *increased* outcome uncertainty. It is suggested that CF associated to alternatives may be *maladaptive* when operating in time-pressured and complex environments that demand quick solutions. Implications associated to the functional usefulness of CF when operating in complex and time pressured situations is discussed.

Chapter 8 is the final concluding chapter to this thesis. It provides a summary of the findings presented in this thesis. It provides a tabulated description to outline how the theoretical antecedents to inertia, which were identified in Chapter 3, were explored in subsequent data chapters alongside results. This discussion chapter fundamentally identifies two main conclusions from the data. Firstly, it identifies how the relationship between stimulus and non-response appears to be mediated by the anticipation of negative consequences. Commanders were found to anticipate potential negative consequences both as a result of taking action and also for not taking action. This led to salient goal conflict and derailed choice via the redundant deliberation on whether to take action or not. Secondly, it identifies the importance of how the characteristics of the decision making context may moderate the usefulness of cognitive processing strategies. Both approach goals and scoring high on cognitive flexibility seemed to *impede* choice when the context was time-pressured and complex. This finding has important implications for training in extreme environments whereby traditionally adaptive cognitive processing styles may be inappropriate. It finally outlines the methodological and research implications of this thesis.

Chapter 2: A methodological framework for researching in real-world settings

2.1 Introduction

The primary aim of this thesis was to explore the concept of decision inertia. It has identified how, despite the plethora of research exploring the relationship between stimulus and response, a relative paucity of research has been conducted to investigate the relationship between stimulus and non-response. This has been identified most saliently within the context of emergency responding, where numerous real-world reports have highlighted how decision making during emergencies derails when emergency response commanders fail to take any action in response to the emergency incident (e.g. Grunewald, Binder & Georges, 2010; National Audit Office, 2006; PEDU, 2012; UNICEF, 2008). This thesis sought to further understand *why* actions failed, through the investigation of decision inertia.

The research focus of this thesis is thus heavily grounded in real-world data. This chapter will describe the methodological framework that was used to facilitate psychological research in the real-world. This chapter is split into four sections that will:

- (i) Outline three main methodological challenges to research in real-world settings (derived from the literature and the experience of data collection for this thesis) relating to:
 - a. Data access
 - b. Data design and collection
 - c. Data analysis
- (ii) Describe how the Naturalistic Decision Making (NDM) paradigm offers an innovative and progressive way to conduct research in real-world settings; specifically by describing two methods utilised in this thesis: Cognitive Task Analysis (CTA) and the Critical Decision Method (CDM).
- (iii) Explore the strengths and weaknesses of qualitative data analysis techniques.
- (iv) Discuss how modern technology (i.e. NVivo) can facilitate the qualitative data analysis process.

2.2 Three methodological challenges to research in naturalistic, real-world environments

Prior to a more detailed critique of the chosen methodology for this thesis, it is important to firstly outline three methodological challenges that are characteristic of research in real-world settings. These conclusions are based on lessons learnt from the literature in culmination with the experience of collecting and analysing data for this thesis. Challenges have been themed into three areas: (i) gaining access to real-world data (i.e. building and sustaining practitioner-researcher relationships); (ii) designing and collecting real-world data (i.e. distinguishing between researcher and practitioner goals); and (iii) analysing real-world data (i.e. ensuring real-world value of findings). Although these three challenges are described separately, they are by no means discrete and can interact with one another. The advice presented in this section to overcome these challenges helped to facilitate data collection for this thesis and offers practical guidance for other real-world researchers.

2.2.1 Challenges with data access: building and sustaining trusted relationships with practitioners

Research in real-world settings is contingent upon having access to data and/or participants who work within the domain of interest (e.g. emergency service commanders). Unlike traditional psychological research, which derives its strength from its predictability and the capacity to extend findings to the wider population, research in specialised, real-world domains prides itself on its ability to provide detailed and rich descriptions about the psychology of a specific group of people with common interests, experience, skills or traits. Traditional psychology seeks to collect data from large sample sizes to increase the ‘power’ and ‘representativeness’ of findings to the general population; although as most research tends to be conducted in universities, and is thus often weighted heavily towards student samples, the realistic generalisation of such findings has been questioned (Demerouti & Rispons, 2014). Comparatively, real-world research seeks to collect data from small and select samples to generate rich and in-depth conclusions. Real-world research is contingent upon access to specific individuals and so there is an imperative need to build, establish and sustain trusted and accessible relationships

between researchers and practitioners; an initial challenge to real-world research projects.

The data collected for this thesis required privileged access to Police, Fire and Rescue and Ambulance Service commanders who were recruited via an existing relationship between the University of Liverpool and the emergency services in the local area. Many real-world research teams involve practitioners who are interested in studying their own work domain. For example, clinical psychologists interested in research may hold dual roles acting as both a physician and a researcher when treating patients (Thompson & Russo, 2012). Likewise, educators interested in trialling new pedagogic practices may engage in ‘active research’ with their students (Locke, Alcorn & O’Neill, 2013). Researching in one’s own work domain makes *access* to participants easier as the researchers are already experts in their research-domain with ready and available participants; however it can also create a number of ethical problems. For example, research in clinical settings risks a diffusion of priorities between patient care and the collection of scientifically interesting data (Thompson & Russo, 2012), and the ‘consent’ of students in pedagogic research is threatened as they are often unaware of the manipulation of their teaching (Locke, et al., 2013).

An alternative way to conduct real-world research, which was used for this thesis, involves *collaboration* between practitioners and external academics. Collaborative teams are useful as they help to better distinguish between research goals and general work goals of ‘the practitioner’. This can help to reduce some of the ethical concerns associated with purely practitioner-based real-world research, as it helps to clarify the difference between normal work behaviour and activity for research. Having both practitioners and researchers involved in a project can clarify research goals by separating academic aims (e.g. to extend scientific knowledge), practitioner aims (e.g. to provide training for practitioners) and mutually beneficial aims (e.g. to generate scientifically grounded, useful recommendations to facilitate performance).

Despite the reciprocal benefits of such relationships, academic-practitioner relationships are difficult to develop. They can take a very long time to build over a course of weeks, months and years. As such, a lot of preliminary work is required prior to data collection in order to test and build connections (Steinheider, Wuestewald, Boyatzis & Kroutter, 2012). Collaborative research is the result of trust

building between both researchers and practitioners, often based upon past successful collaborations (Tillyer, Tillyer, McCluskey, Cancino, Todaro & McKinnon, 2014). For example, prior to data collection for this thesis, many hours were spent working closely with practitioners from the three blue lights services; attending training events and ‘ride-alongs’ and chatting informally during downtime. There was also an existing relationship between the emergency services and the University of Liverpool as a result of past successful research collaborations (e.g. van den Heuvel, Alison & Crego, 2012; van den Heuvel, Alison & Power, 2014) and the input that psychologists within the department had provided at various strategic workshops and training events. The existence of an evidenced, mutually beneficial relationship enabled privileged access to an incredibly rare sample of participants. For example, 31 command level participants agreed to take time out of their demanding schedules to participate in 2 hour long cognitive interviews. The participants themselves did not gain any obvious *direct* benefits from participating (e.g. payment, work credit), but based on their experiences in the past (either vicariously or directly), they were enthusiastic to participate in work that can benefit working practices within their organisation.

In addition to facilitating access to data, relationship building can also help to develop a more informed understanding of the context of real-world data. Researchers who immerse themselves in the research domain of interest whilst building relationships can improve their understanding of the work domain, which may help them to develop more informed research questions and make useful changes in their data collection design (Crandall, Klein & Hoffman, 2008). For example, during relationship building for this thesis, it was noted that participants used a lot of agency-specific terminology. The researcher realised that they needed to develop a greater understanding of this language prior to data collection. This was in order to feed relevant terminology into the design of interviews by, for example, using agency-specific terminology when conducting interviews with different agency representatives (e.g., ‘NDM’ when describing the Police ‘National Decision-making Model’; ‘SRT’ to describe the ‘Search and Rescue Team’ to the Fire and Rescue Service; ‘HART’ when referring to the ‘Hazardous Area Response Team’ members with the Ambulance Service). The use of domain-specific language during interviews helped to establish a relationship with practitioners, as they did not feel the need to restrict their discussion to non-specialist vocabulary and thus described

incidents more freely (Pfadenhauer, 2009). An awareness of terminology further helped during the semantic coding of interviews during data analysis. Therefore, an integral element to research in real-world settings is to immerse oneself in the world of the practitioner, in order to build trusted relationships with practitioners to facilitate greater access to data and a more informed understanding.

2.2.2 Challenges to designing and collecting data: distinguishing between practitioner needs, academic aims and collective goals

Data collection in real-world settings has both great strengths and inherent weaknesses. Positively, the ability to collect data from real-world incidents or during highly immersive live or simulated training exercises means that the ecological validity of findings is incredibly powerful. The use of detailed interviews with experts and the ability for the researcher to immerse themselves in the practitioner's world facilitates the development of quasi-expertise in the domain of interest (Pfadenhauer, 2009). This allows findings to contribute to psychological research whilst maintaining a useful real-world impact. For example, feedback from the data collected in this thesis will be fed into a presentation, which will be presented to the emergency services with detailed recommendations on the lessons that have been learnt.

Although collaborative research may overcome some the ethical challenges associated to being both a researcher and a practitioner (Locke et al., 2013; Thompson & Russo, 2012), confusion may still arise in identifying 'research goals' (i.e. academic findings), 'practitioner goals' (i.e. applied recommendations and/or training) and 'collective goals' (i.e. mutual benefits). When researchers wear 'too many hats' in trying to achieve multiple research goals it can confuse the focus of research (Seider, Davis & Gardner, 2007). For example, the 'Hydra' simulation that was developed for this thesis was designed to facilitate training of emergency response commanders by exposing them to multi-agency decision making in response to a 'Maundering Terrorist Firearms Attack' (MTFA). The scenario was developed through collaboration between the researcher for this thesis and training facilitators from each agency. Although this increased the realism and ability to input useful decision problems as identified by Subject Matter Experts (SMEs), it also created difficulties in trying to meet both research and training needs. For example, *research* goals involved the desire to keep injects relatively consistent and stable

across groups in order to facilitate quantitative statistical comparisons, whereas *training* goals sought flexibility in the provision of information in response to individual training needs. This can cause tension during the design and facilitation of data collection as there is no clear dominant goal. If these tensions are not addressed during the initial *design* of a research study, practitioners will feel frustrated as they perceive little benefit from engaging in research, whilst researchers feel that their recommendations are being ignored (Rosenbaum, 2010).

To reduce goal conflict during real-world data collection, it is important to identify *common goals* between practitioners and researchers. This is an important first step during data collection design as it provides an opportunity to input mechanisms to overcome any future issues that may arise. Early and clear communication about collective goals can help to close the gap between academic and practitioner perspectives, and even help to shape conclusions through collaborative theorising (Tillyer et al., 2014). Indeed, the simulation presented in this thesis was designed following close collaboration with training representatives from the three blue lights services. Prior to data collection, the research team identified that the scenario needed to remain relatively consistent across training groups in order to meet research requirements, whilst it also needed to offer a level of flexibility to challenge the training requirements of different individuals. The communication of these goals allowed a compromise to be reached, whereby nine key injects in the scenario remained linear across groups, however SMEs from each agency attended each simulation event to provide additional, dynamic information in response to training needs during the course of the simulation (see Chapters 6 and 7 for more detail). This enabled research to meet both practitioner and research aims by anticipating and adapting to potential conflicts of interest ahead of time, in order to ensure that ‘quality’ data was collected (Glaser & Laudel, 2009).

2.2.3 Challenges to data analysis: deriving informed and useful conclusions from ‘messy’ data

Data analysis can also be challenging for real-world researchers as data sets are far more diverse than those collected from traditional lab-based settings. Data collected in real-world settings is varied and diverse, including field notes, audio and video recordings, questionnaires and interviews. It can be derived from a variety of settings, including live exercises, simulations, interviews, and at times, during real-

world operations. This enhances the depth of data and further offers the opportunity to triangulate findings using flexible research tools; however it also means that initial data sets are often ‘messy’ and diverse as tight experimental control is not possible, nor desirable. Thus, a final key challenge to conducting real-world research relates to problems associated with analysing complex and large data sets.

Qualitative analyses are commonly utilised to make sense of data collected from real-world settings. It can be used to analyse spoken and/or written text, along with observations and field notes collected from naturalistic settings (Reavey, 2011). A more detailed discussion of the strengths and weaknesses of qualitative analyses will be outlined later in this chapter, but in short, although it has strengths in providing depth and meaning to findings, it is, rightly or wrong, often perceived as less scientific than more objective, quantitative techniques (Malterud, 2001). Although a number of methodological papers have sought to highlight the strengths of qualitative analyses by outlining criteria (e.g. rigor, sincerity, credibility etc.) for ‘excellent’ qualitative research (Tracy, 2010), there continues to be a lack of explicit and coherent information on how to *analyse* qualitative data sets (Malterud, 2001). Indeed the consideration of data analysis is often disregarded until large and voluminous data sets have been acquired, leaving researchers confused and overwhelmed with how to make sense of the data (Liamputtong, 2009). Furthermore, the qualitative methods that are available are often poorly or wrongly described and rarely distinguished between (Vaismoradi, et al., 2013). More recently, there has been an increase in the publication of qualitative research (Carrera-Fernandez, et al., 2014) and increased criticism of quantitative research for creating artificial objectivity that ignores the subjective influence of the researcher’s interest and prior knowledge (Parker, 2004). However, as the methodological focus on qualitative data analysis has only gained momentum over the past few years, the challenge for how to analyse real-world data sets remains.

One way of overcoming the challenges associated with real-world data is to triangulate analyses. This involves combining data from different sources in order to strengthen conclusions (Parker, 2004). For example, this thesis collected *exploratory* data by conducting cognitive interviews with experienced emergency response commanders, and further supplemented findings through the use of more *confirmatory* analyses of data collected from a controlled MTFA simulation exercise. This allowed for triangulation of data as it was possible to test the findings

generated from the qualitative analyses of interviews, through a more controlled quantitative analysis of data collected from the simulation questionnaires. The key themes that emerged from the interviews relating to goal orientations and uncertainty were analysed in more statistical detail via the distribution of questionnaires following the simulation. This helped to strengthen conclusions by offering a way to test interaction effects (e.g. how did goal orientations interact with delaying behaviour?). The convergence of these different approaches to analysis is useful for enabling the generation of theoretical conclusions from real-world data (Hammond, 1996) and represents a shift in methodological focus in favour of progressive and hybrid practices to improve the understanding of psychological phenomena (Katsikopoulos & Lan, 2011). Furthermore, using ‘messy’ data may actually strengthen the impact of findings as the researcher is able to more fully immerse themselves and understand the myriad of variables that influence human behaviour in the real-world, using diverse, reflexive, meaningful and specific analysis techniques (Harre, 2004). Thus, although the analysis of real-world data may be challenging, providing that the researcher makes informed considerations on *how* to analyse data during the early design and collection phases, then it is possible to derive great strengths from researching within rich and naturalistic settings (Liamputtong, 2009).

2.2.4 Conclusions on the typical challenges to applied research

This chapter has outlined some of the key methodological challenges associated with real-world research related to data access, data design and collection and data analysis. By providing worked examples from the data that was collected in this thesis, it has provided an indication of how these methodological challenges may be overcome. In order to address these challenges more fully, the next section of this methodology will focus more specifically on the methodological paradigm upon which this thesis was based: Naturalistic Decision Making (NDM).

2.3 Naturalistic decision making (NDM) research

The second part of this chapter will describe the methodological paradigm that this thesis followed: Naturalistic Decision Making (NDM). It will describe how Cognitive Task Analysis (CTA) can facilitate the collection of real-world data, and specifically describe the Critical Decision Method (CDM) interview technique that

was used to interview commanders from the emergency services. NDM seeks to understand the cognitive processes associated with choice implementation ‘in the wild’ (Gore, Banks, Millward, & Kyriakidou, 2006; McAndrew & Gore, 2013). Rather than impose artificially constrained experimental methodologies on research, NDM emphasises the importance of context, domain specific expertise and macrocognition (i.e. complete cognition) in team-based environments (Stanton, Wong, Gore, Sevdalis, & Strub, 2011). An overreliance on ecologically invalid lab based settings is inappropriate for problem solving research (Schneider & Shanteau, 2003) as the real-world is characterised by ill-structured problems, uncertainty, poorly defined goals, multiple feedback loops, time constraints, high stakes, multiple players and conflict between personal ideals and contextual requirements (Orasanu & Connolly, 1993). For instance, the influence of social interaction on team-based choice cannot be replicated in randomised experiments with participants who are unknown to one another. NDM strives to achieve meaningful, grounded and detailed conclusions by acknowledging the importance of personal experience (Klein, 2008) and social dynamics (Allwood & Hedekin, 2005).

NDM is based on the assumption that cognitive processing in the real-world varies, situation assessment is critical, mental imagery is important, the decision making context must be specified, decision making is dynamic, and research should focus on how decision makers *actually* function rather than how they *ought* to function (Lipshitz, 1993). Researchers must be flexible and open-minded when exploring their data, which in turn facilitates the management of large and ‘messy’ data sets to enable the discovery of novel or previously missed psychological phenomena. For example, analysis of observational data in the real world has facilitated a greater understanding of how human behaviour progresses over time and interrelates with social relationships (Faraone & Dorfman, 1997; O’Connor, 1999). The ‘cognitive interviewing technique’ has helped to improve knowledge on the cognitive processes associated with expertise and ‘Recognition Primed Decision Making’ (Klein, 1998; 2008). Klein (1998; 2008) utilised flexible NDM methods to discover how expert firefighters did not *compare* options to find the *best* response when faced with difficult decisions, but instead *evaluated* options in rapid singular succession to find one that was *good enough*. NDM methods have been used successfully with the emergency services, and are an appropriate paradigm to follow. Furthermore, as NDM methods are flexible and so allow researchers to develop and

test theories during the course of data collection, by for example, asking interviewees about developing theories as they emerge, this facilitated the *generation* of theory during the initial interviews that were conducted for this thesis.

Cognitive Task Analysis (CTA) is the key method used by NDM researchers to “*systematically identify key cognitive drivers*” (p.4; Crandall, et al., 2006) that influence decision making in naturalistic settings. It is an approach to real-world research that has been successfully applied to a variety of domains including the military (Cannon-Bowers, Bowers, Stout, Ricci & Hildabrand, 2013; Drury & Darling, 2007), aviation (Keller, Leiden & Small, 2003), intelligence analysis (Tecuci, Boicu, Ayers & Cammons, 2005) and emergency service response (Prasanna, Yang & King, 2009; Wong, Sallis & O’Hare, 1997). CTA is systematic approach to facilitate research on the expertise and ‘macrocognition’ (i.e. expertise in natural contexts) that individuals use to solve problems in cognitively complex, dynamic and uncertain environments (Gordon, 1995). It focuses on context rich descriptions of decision *processes* rather than decision outcomes (Zsombok, 1997). Importantly, CTA is an *approach* to research that includes a variety of different *methods*. The ‘Critical Decision Method’ (CDM) interview technique is a one type of CTA method used to collect rich and detailed data on the cognitive processes used by experts when responding to challenging events (Crandall, et al., 2008).

A primary goal of CTA is to develop an understanding of an experts’ mental models, perceptual skills (including subtle cues), sense of typicality, routines and declarative knowledge (Klein & Militello, 2004), whilst ensuring that findings have applied value to practitioners (Klein, Calderwood & McGregor, 1989). As this thesis sought to explore the concept of decision inertia in emergency response settings, the CTA process was an appropriate approach to follow. CTA moves beyond description of the steps required to perform a task and towards a greater understanding of the knowledge, skills and strategies used by experts (Klein & Militello, 2001). The CTA researcher is encouraged to immerse themselves in the practitioners’ world, creating an alternative mode of enquiry to laboratory-based research that often fails to embrace data source complexity (Gore, et al., 2006). CTA is ‘cognitive’ as its focus is on thinking and reasoning; it is concerned with ‘tasks’ as it is interested in the desired outcome of thought processing; and it is a type of ‘analysis’ that seeks understanding for how the component parts of cognition relate with task outcome

(Crandall, et al., 2006). This chapter will briefly outline the three key phases to conducting a CTA.

2.3.1 Phase one: Knowledge Elicitation (i.e. What do people know? How do they know it?)

The first phase to conducting a CTA is ‘knowledge elicitation’. This is when the researcher identifies the type of data that will be collected from participants (Crandall, et al., 2006). For example, is the research interested in eliciting knowledge through interviews, observations or questionnaires, and will data focus on descriptions of complex procedures or challenges to decision making? The knowledge elicitation phase starts during study design, as the researcher considers the type of data they are interested in and the most appropriate methods they can use to access this data. For example, a researcher interested in understanding how emergency department doctors expertly adapt to unanticipated medical emergencies would learn little from interviewing inexperienced medical students in the emergency department, or experienced doctors working on general wards. Knowledge elicitation is central to early CTA planning. Table 2.1 outlines the ‘framing questions’ (Crandall, et al., 2006) and answers that were used to develop knowledge elicitation *aims* for this thesis.

Table 2.1: Framing questions to guide the *aims* of knowledge elicitation

Framing Question	Answer
1) What issue or need do you plan to address?	To explore the potential causes to decision inertia in emergency response contexts.
2) What will you deliver at the end of the project?	An outline of the main impediments to strategic decision making and contributory causes to decision inertia, with recommendations for how to overcome them.
3) What sorts of people can tell you about this issue?	Experienced commanders from the Police, Fire and Rescue and Ambulance services, who are qualified to command at ‘tactical’ (or ‘silver’) level and upwards.
4) What aspects of expertise or types of cognition do you need to know about?	The cognitive barriers to decision making that participants’ have found difficult to deal with in the past, along with the expert knowledge/techniques they used to cope with them.
5) What type of situation will tell you the most about the issue you are exploring?	Incidents that are high-stakes, complex, and with irreversible challenging consequences.

Once the *aim* of knowledge elicitation is established, it's important to identify the *process* that could achieve these aims. Once more, self-reflective questions can help to facilitate this process (Crandall, et al., 2006). Specifically, researchers should think the data *content* that they are interested in (i.e. retrospective recall, real-time verbalisation or hypothetical scenarios; simulated or realistic incidents; easy or challenging events) and what data *collection* method is therefore most suitable (i.e. interviews, self-report, observation, think-aloud). Table 2.2 outlines the questions and answers that helped guide the knowledge elicitation *process* for this thesis' two main CTA studies.

Table 2.2: How the planning for 'knowledge elicitation' was structured in this thesis

Research Question (RQ)	Data Collection	Data Content
RQ1: What are the main challenges to decision making as experienced by command level decision makers in the emergency services?	Interview (Critical Decision Method)	Retrospective Realistic Challenging
RQ2: Are the challenges to decision making as identified by RQ1 evident during a real-time simulation exercise involving command level decision makers from the emergency services?	Self-report (Questionnaires about simulated exercise)	Real-time Simulated Challenging

2.3.2 Phase two: Data Analysis (i.e. structuring the data, identifying findings, discovering meaning)

Data analysis is the second phase to a CTA study. This is where the researcher starts to structure, identify themes and discover the meaning from their data (Crandall, et al., 2006). Analyses in CTA projects are predominantly qualitative and can include techniques such as thematic analysis (Braun & Clarke, 2006); grounded theory (Glaser & Strauss, 1965); and content analysis (Vaismoradi, et al., 2013). As traditional qualitative techniques tend to focus on *social* processing, it is important that the CTA researcher does not lose their focus on *cognition* (Crandall, et al., 2006). The data analysis phase of a CTA includes preparing the data for analysis (i.e. transcribing data); data structuring and initial coding (i.e. annotate transcripts;

catalogue nodes); discovering meaning (i.e. refine codes; identify themes); and finally linking findings (i.e. link to relevant theories; relate to practitioner) (Crandall, et al., 2006; Liamputtong, 2009). Depending upon the focus of the research questions identified in phase one, analyses will follow a *structured* approach to test for *existing* theories (i.e. deductive) or an *explorative* approach to discover *emergent* themes (i.e. inductive) (Wong, 2003). This thesis sought to *develop* a theoretical understanding of the main challenges to emergency commanding that may contribute to decision inertia; thus it favoured an *inductive* grounded theory approach to analysis, which is discussed in more detail below.

2.3.3 Phase three: Knowledge Representation (i.e. displaying data, presenting findings, communicating meaning)

Knowledge representation is the final phase to a CTA. It describes the means by which the researcher communicates their findings to the wider academic and practitioner communities. It is central to CTA, as a key strength to NDM research is that it can provide practitioner-based recommendations (Wong, 2003). The inherently qualitative nature of CTA projects means that there are often voluminous and text-heavy descriptions of cognitions and behaviour that are derived from the data. It is contingent upon the skills of the researcher to reduce and clearly convey the main message to be learnt from the CTA project (Liamputtong, 2006). For example, the translation of findings in the current thesis into visual models was important to translate dense and text-heavy chapters. Possible ways to present CTA data include the use of narratives that describe the story of how knowledge is derived; chronologies to communicate the structure of knowledge through time; or decision requirements tables to show the elements that interact with specific decisions (Crandall et al., 2006). Another popular method for knowledge representation is the use of concept maps. This involves the presentation of different 'concepts' in node format, which can then be visually linked to one another in order to explain the relationship between different concepts (Crandall, et al., 2006). Indeed concept maps can be used during earlier data analyses phases in order to facilitate the structuring of data into themes and codes (Bazerley & Jackson, 2013). Thus, as a whole, the CTA method facilitates the collection of data from real-world environments as it offers a systematic and scientific framework to structure a research project whilst, importantly, maintaining a context-rich and meaningful

approach to conveying real-world findings. In order to provide a worked example of how CTA can facilitate real-world research, a detailed description of the CDM interview protocol that was used for this thesis will now be discussed.

2.4 The Critical Decision Method (CDM) interview

The third part of this chapter will outline the CDM interview protocol that was used to collect data from interviews with emergency response commanders. This will provide a worked example of the strengths of the CTA approach in providing rich methodologies to collect detailed data on cognitive processing in the real-world. As outlined in Tables 2.1 and 2.2, the primary aim of this thesis was to improve the understanding of the challenges to command level decision making in the emergency services. There was little previous literature that addressed this question, so it was decided that an exploratory and inductive approach to research was most appropriate. This was in order to develop a foundation of knowledge to explore the problem in more (statistical) detail at RQ2 (Bogner, Littig & Menz, 2009).

Qualitative, *semi-structured* interviewing was the chosen approach as it facilitates the discovery of new conceptual and theoretical knowledge about the life experiences of the interviewee (DiCicco-Bloom & Crabtree, 2006). This was instead of more *structured* interviewing, whereby questions are pre-determined, linear and rigid, as it allows the researcher flexibility to engage and probe participants. Furthermore, a *fully-unstructured* interview style, which involves ethnographic observation of participants and the taking of field notes (DiCicco-Bloom & Crabtree, 2006), was impractical, as incidents are unknown ahead of time and so access to commanders during large scale incidents could not be predicted, and unethical, as the researcher may disrupt the ability for the commander to respond. Furthermore, as this thesis was interested in understanding decision making barriers at a *cognitive* level, it is unlikely that interviewing in structured or fully-unstructured contexts would produce the desired descriptive detail due to the reduced opportunity for cognitive probing.

It was also decided that *individual interviews* (i.e. one participant at a time) were most appropriate for data collection, as they can generate detailed and personal insights into decision making. Focus groups were avoided as, although they are more time-efficient than individual interviews and may offer diversity in the trade-off of

opinions between focus group members, the sensitive nature of asking commanders about their personal struggles meant that commanders would be unlikely to discuss their problems openly (Hollander, 2004). Individual interview contexts however can facilitate open discussion about sensitive issues in a non-judgemental and relatively anonymous environment (Lambert & Loiselle, 2008). Although not possible during the current thesis due to access and time constraints, it has been suggested that supplementing individual interviews with subsequent focus groups may triangulate and strengthen findings to test the theoretical models that have been derived (Lambert & Loiselle, 2008).

Thus, a series of individual, semi-structured interviews with command level decision makers from the three ‘blue lights’ services were required in order to address RQ1. It was important to specifically target *experienced* commanders (as opposed to novices) as ‘expert interviews’ are useful for creating rich real-world descriptions about novel or under-researched topics (Bogner & Menz, 2009). Experts not only possess *knowledge* about their domain, but they also have the metacognitive ability to *describe* their knowledge in an analytic and reflective manner (Klein & Militello, 2004). Thus interviewing experienced commanders (judged by their qualification as a ‘tactical/silver’ commander) was deemed an important requirement for RQ1 as “*talking to experts in the exploratory phase of a project is more efficient and concentrated method of gathering data than, for instance, participatory observation or systematic quantitative surveys*” (p. 2; Bogner, Littig & Menz, 2009).

A CDM interview aims to “*identify the knowledge requirements, expertise and goal structures involved in performing a decision maker’s work*” (p.327, Wong, 2003) by exploring high stakes decision making (e.g. Wong & Blandford, 2001; O’Hare, Wiggins, Williams & Wong, 1998), whilst generating applicable recommendations from conclusions (Crandall, et al., 2006). It is a *method* used to facilitate the CTA *approach* as it is useful for exploring cognitions in the real-world. The procedure for conducting a CDM interview involves the retrospective recall of experts about a challenging decision making incident that they have experienced in the past (Wong, 2003). This involves the multi-pass retrospection of an incident in which the decision maker felt that their cognitive processing was challenged (Hoffman, Crandall & Klein, 2008) via four ‘sweeps’ (i.e., phases) of the interview (i.e. incident identification, timeline verification, deepening probes, ‘what if?’

probes). Each interview ‘sweep’ is designed to deepen the cognitive understanding of the challenging incident (Hoffman, et al., 2008) by progressing the interviewee through initial rapport building to general recall, cognitive reflection and dynamic flexible thinking.

A key requirement for researchers conducting CDM interviews is that they are familiar with the specifics of the research domain (e.g. terminology, work processes) that they are exploring (Crandall, et al., 2006). The interviewer should strive to achieve ‘quasi-expert’ status by increasing their understanding of the expert’s domain (Pfadenhauer, 2009). For example, the author of the current thesis spent over a year prior to interviewing commanders immersing themselves in the work environments of the three blue lights services by reading policy documents, attending training events and establishing informal interpersonal networks with experts. Not only does a researcher’s familiarity in the research domain enhance planning during the *knowledge elicitation* phase of a CTA and *knowledge representation* during the interpretation of results, but it can also help *data collection* as the interviewee feels more able to discuss their cognitions in an informed yet non-competitive environment (Trinczek, 2009). The interviewer must be well versed with the design and type of questions that will be used during their interviews to be able to probe the responses of interviewees, without deviating too much or losing control of the research area of interest (Hoffman, Crandal & Klein, 2006). Table 2.3 outlines the interview protocol used for the CDM interviews of this thesis. Furthermore, as was the case with the present data collection, the use of a second interviewer during interviews is useful as it allows the primary interviewer to establish their quasi-expert relationship by focusing on rapport building over note taking throughout each sweep of the interview (Hoffman, et al., 2006). Each sweep of the CDM protocol followed for this thesis will now be outlined in more detail.

2.4.1 Sweep one: Incident identification

The first sweep of a CDM interview involves the identification and description of an event that is relevant to the research question. For example, the current thesis was interested in exploring the main challenges to emergency response decision making that may contribute to decision inertia. All participants received the

following description at the start of their interview in order to help identify a suitable incident:

“In this interview I will ask you about your experience as a command level decision maker. In a minute I am going to ask you about a difficult decision that you made in the past. We will work together to pick a suitable decision and then draw up a timeline leading up to your choice. I will then ask some more specific questions about your decision to help me understand it in more detail and to help support your recall. Please take as much time as you need to respond and feel free to use the pen and paper provided to reflect or sketch something at any time during the interview.”

It was important that participants identified an incident that went beyond procedural knowledge in order to discover the cognitive components required for expert decision making (Hoffman, et al., 2008). Indeed this is one of the key strengths of the CDM method as it helps to access unique and specialised knowledge held by the expert with regards to the cognitive processing of challenging events. Two key requirements for incident identification are that the expert was the decision maker during the incident (i.e. first person narrative) and that their actions directly impacted upon the outcome of the incident (Crandall, et al., 2006). It is important that during this process that the researcher allows for silence and to restate criteria should the interviewee stray off-topic by using a priori defined prompts outlined on their interview protocol (Appendix One). Examples from the current researched included clarification that it should be an *“especially challenging”* incident with *“high consequences”* that would be *“very difficult to reverse”* once the decision was made. The ability to assist interviewees in identifying relevant decision challenges is a key skill for CTA data collection, which develops over time as the interviewer becomes more skilled at using the CDM technique (Crandall, et al., 2006).

Once a suitable incident has been identified and agreed upon by both the interviewer and the expert, then the interviewee will provide a narrative walkthrough of the incident from start to finish without interruption from the interviewer (the first sweep of incident recall). The researcher should listen for pauses and intonation to help them identify key aspects of the narrative. They must also develop confidence to re-focus the interviewee with gentle probes if they begin to drift off topic. At the end of this sweep, it is recommended to check for ‘pre-starts’ (i.e. did anything

happen before this incident?) and ‘second endings’ (i.e. what happened after the event?) to ensure a full and informed narrative (Crandall, et al., 2006). During this process the primary interviewer takes detailed notes about the incident to prepare for the ‘retelling’ of the narrative in sweep two. It was found during the current research that it was useful for the second interviewer to engage visually with the interviewee as the primary interviewer took notes during sweep one. This appeared to encourage the interviewee to continue talking despite a lack of eye contact from the primary interviewer, who needed to take their own notes during this time to prepare for sweep two: timeline verification.

2.4.2 Sweep two: Timeline verification

The second sweep of a CDM interview involves timeline verification via the process of ‘incident retelling’. This is when the primary interviewer describes the narrative to the incident back to the interviewee with reference to notes that they have recorded. It is useful to mirror the terminology used by the expert during their initial telling of the incident, to help establish a ‘quasi-expert’ status (Pfadenhauer, 2009). During this second sweep, the expert is encouraged to correct any errors made by the interviewer and to add any missing details that come to mind. For the current thesis, timeline verification was found to take much longer than the initial open description of the incident due to the volume of extra information provided by participants once they thought more deeply about the incident. After a common understanding of the incident is established, both participant and interviewer work together to construct a timeline of the event to prepare for the third sweep: deepening probes. For the present thesis, the interviewee was asked to draw a timeline of their chosen incident on an A3 piece of paper. They were asked to identify the ‘critical turning points’ of the incident in chronological order. To help guide this process, interviewees were told to imagine that they were writing a script for a ‘Hollywood film’ about their incident and so they needed to include all the key points. Alternatively, it has been suggested that timelines can be constructed using tools such as post-it notes, which can be moved around if the interviewee wants to reorder the sequencing of events (Wong, 2003).

2.4.3 Sweep three: Deepening probes

Sweep three involves the progressive deepening of the incident by focussing attention on the critical points that were identified during timeline verification. The expert is asked to talk through the narrative of the incident again, but this time they are guided by the interviewer who uses ‘cognitive probes’ (i.e. questions) to ask for more details (Table 2.3). Cognitive probes are the questions that the interviewer has prepared prior to the interview, which are used to deepen the analysis of expert problem solving. Not all probes will be used in every interview, nor is the researcher limited to probes on their list as they can create additional ones guided by their curiosity at that time of the interview. Probes tend to include questions about the presence or absence of cues; the meaning of cues; the expectations about the situation; the goals/actions considered; the options being evaluated; and the uncertainties experienced by the decision maker (Crandall, et al., 2006; O’Hare et al., 1998). A full list of cognitive probes used in this thesis is outlined in Table 2.3. They were grouped into six categories: basis of choice; goals; information and cues; influence of uncertainty; decision barriers; and decision strategy. They were inspired by other CDM interviews available from the literature (e.g. O’Hare et al., 1998) and adapted to include probes that were specific to the research question (i.e. decision challenges).

Table 2.3: Probes used in ‘sweep three’ of the CDM interview

DEEPENING	
INSTRUCTIONS: Now I want to go through the incident again but this time we want to look at it in a little bit more detail. I’m going to guide you with some questions	
PROBE TOPIC	PROBE
Basis of choice	<p>Why did you select/reject this course of action?</p> <ul style="list-style-type: none"> • What did you believe the consequences of your choice may be? • What were these beliefs based upon? • How did you feel when making this decision? <p>Were you following any standard rules or operating procedures?</p> <ul style="list-style-type: none"> • Had you been trained to deal with this type of event? • What specific training or experience helped you make this choice? • Were you reminded of any previous experiences? <p>Did you consider any other courses of action?</p>
Goals	<p>What were your specific goals or objectives?</p> <p>What was the most important priority for you at this point in time?</p>
Information and Cues	<p>How did you know that you needed to make the decision?</p> <ul style="list-style-type: none"> • How did you know when to make the decision? <p>What information did you use in making your decision?</p> <ul style="list-style-type: none"> • What were you looking at? <p>What did you do with the information you had?</p> <ul style="list-style-type: none"> • Did you use all the information you had available to you? • What was the most important piece of information you used? <p>Where did you get this information?</p> <ul style="list-style-type: none"> • Did you seek guidance from someone else at this point? • How did you know to trust the information? <p>Was there any additional information that you would have liked?</p>
Influence of uncertainty	<p>Were you uncertain about either the reliability or the relevance of the information that you had available?</p>
Decision barriers	<p>In your opinion what were the biggest barriers to your decision making on that day?</p> <p>Were there any organisational or social barriers which made your decision more difficult?</p> <ul style="list-style-type: none"> • Within your own organisation? • From external organisations? <p>Did complexity or uncertainty in the decision making environment make your decision making difficult?</p> <ul style="list-style-type: none"> • At any point did you find it difficult to process the information you had? • Were you uncertain about the appropriateness of your decision? <p>Were you expecting to have to make this type of decision during the incident?</p> <ul style="list-style-type: none"> • How long did it take to reach the decision? • Did you feel time pressured at all?
Decision strategy	<p>Did you try and avoid making this decision at any point?</p> <p>What types of actions did you take to try and make this decision?</p> <ul style="list-style-type: none"> • Do you think that you could develop any rules which could assist another person to make this decision successfully?

2.4.4 Sweep four: ‘What if?’ Probes

The final sweep of the CDM interview shifts the expert’s focus away from what *actually* happened during the incident and orients their thinking on *hypothetical* ‘what if?’ questions. The purpose of this phase is to generate a more analytic consideration of the situation from the perspective of the expert; specifically in terms of what might have happened under different circumstances (Crandall et al., 2006). This final phase is especially useful for NDM research as it can help to generate practical recommendations derived from collective expert knowledge across interviews. For example, experts in the current studies were asked three key questions in this final sweep: (i) how they believed a novice may have behaved differently; (ii) what they would do differently if they responded again with hindsight; and (iii) what top tips they would give to someone faced with a similar challenging incident. Expert insight into these questions can help to generate applied recommendations from the research. It also helps guide analysis of data, as it identifies the aspects of the incident that the expert perceived to be most important.

2.4.5 Summary of the CDM interview technique

This chapter has thus far outlined the main aims of this thesis and the methodology that was followed to achieve these aims. Specifically, it sought to collect real-world data on the cognitive processing of emergency services commanders to further the conceptual understanding of why actions may fail in extreme emergency environments. The thesis was inspired by the NDM paradigm as it sought to explore decision making ‘in the wild’ by unpacking the cognitive processing of experts in domain-specific environments, and took a CTA approach to the design, collection and analysis of data, as it offered a useful scientific framework to facilitate ecologically valid yet informed and precise data from naturalistic environments. More specifically, the CDM interview protocol was utilised as it specifically focused on *experts’* recall of *real-world* experiences about *challenging* decision making events, whilst maintaining focus on the *cognitive processes* that helped, or hindered, choice implementation. Thus, not only does this approach create great strengths in presenting real-world data with applied value to practitioners, but it further ensured that scientific rigor was maintained to contribute to psychological

theory. The data *analysis* technique used to interpret the data will now be discussed in more detail, by providing a detailed discussion on qualitative analyses.

2.5 Qualitative data analysis

Qualitative data analysis is appropriate for a research project whereby “*the researcher trusts textual data more than numerical data and analyses this data in its textual form instead of transforming it into numbers for analysis, with the objective of understanding the meaning of human action*” (p.22, Carrera-Fernandez, et al., 2014). It is complimentary to the NDM paradigm as it helps the researcher to understand psychological phenomena from the perspective of those who have experienced them (Vaismoradi, et al., 2013). Qualitative methods can transform large and voluminous data sets into insightful and meaningful conclusions (Liamputtong, 2009). Such methods can facilitate the *data analysis* and *knowledge representation* phases in CTA projects that consist of large and ‘messy’ data sets. Qualitative research has a rich history as some of the earliest psychologists including Wilhelm Wundt (1832-1920), arguably the first ‘psychologist’ (Bringmann, Balance & Evans, 1975), sought to understand human psychology through the subjectivity of people (Marecek, 2003). Yet, with the advent of more mathematical and computerised procedures for *quantitative* research, it fell out of favour with mainstream psychology (Rennie, Watson & Monteiro, 2002). It is only since the early 1990s that interest in qualitative research has resurged (Carrera-Fernandez, et al., 2014), with more publications in mainstream journals (Madill & Gogh, 2008).

2.5.1 Different qualitative analysis techniques

There are a range of different epistemological perspectives and approaches to conducting qualitative analyses (Vaismoradi, et al., 2013). Madill and Gough (2008) outline how data can be collected from a variety of sources including interview data (e.g. telephone, face to face), collaborative data (e.g. role playing, Delphi groups), naturally-occurring data (e.g. diaries, archival data), observational data (e.g. field notes, recordings) and structured data (e.g. protocols, vignettes). It is most commonly associated with transcribed and textual data from audio- and/or video-recorded interviews (i.e. CDM interviews), focus groups, communications ‘in vivo’ and questionnaires (Reavey, 2011). The general process of analysing textual data involves four steps: (i) initial reading of transcripts; (ii) early coding of transcripts;

(iii) refinement of codes (possibly into higher order ‘themes’); and (iv) creating a theoretical argument by linking codes and themes together (Liamputtong, 2009).

Generally, coding is either inductive, whereby the researcher derives codes based on ‘bottom-up’ analyses of the text, or deductive, whereby the text is coded ‘top-down’ in line with prior theories or coding dictionaries (Braun & Clarke, 2006). The type of coding differs depending upon the end-goals of the project. It may involve discursive analysis (i.e. focus on how discourse shapes social/cognitive processing); thematic analysis (i.e. inductive or ‘bottom-up’); structured analysis (i.e. deductive or ‘top-down’); or instrumental analysis (i.e. specific philosophical approach to data) (Madill & Gough, 2008). For example, ‘discourse analysis’ is a discursive method that explores how the *language* used by individuals interacts with social concepts (Liamputtong, 2009); whereas ‘narrative analysis’ is an instrumental method that focuses on how individuals construct stories that convey meaning to others (Liamputtong, 2009). One of the most popular qualitative analysis techniques is structured ‘content analysis’, whereby the researcher uses a coding dictionary to establish frequency counts of different codes that can be subjected to subsequent statistical analyses (Carrera-Fernandez, et al., 2014; Vaismoradi, et al., 2013). Also common is ‘thematic analysis’, which uses both inductive and deductive processes to provide a rich description of data themes (Braun & Clarke, 2006).

Grounded theory (GT) is similar to thematic analysis, but in addition to describing the data it also aims to generate theoretical conclusions (Glaser & Strauss, 1965; Lo, 2014). As this thesis sought to *explore* the novel concept of decision inertia in emergency response domains (Table 2.1) and because research on this topic was limited, an inductive GT approach was chosen. GT was developed during the evolution of scientific thought on symbolic interactionism (i.e. a theory of human behaviour that describes how an individual’s sense of self is defined by and altered their social interactions with society) (Annells, 1996) and assumes that humans interact with the world via symbolic interactions, the most obvious way being through language (Sarantakos, 1993). It assumes that a person’s language can be coded to identify their ideas and thoughts about a concept (i.e. the challenges to command), which can contribute to a theoretical model of human interaction with the social world (Amsteus, 2014).

The process for conducting GT analyses involves coding textual data (i.e. creating descriptive categories of the data); theoretical sampling (i.e. sourcing data from theoretically relevant sources); and memoing (i.e. keeping an audit of ideas during analysis). This should be performed whilst maintaining awareness of the theoretical sensitivity of conclusions (i.e. thinking about the data in theoretical terms); engaging in constant comparison of the data (i.e. constantly contrasting the data against itself); and identifying the point of saturation (i.e. when to develop a final explanatory theory). It is important that researchers self-monitor their progress during qualitative data analyses to ensure that their conclusions remain grounded in the data (Mueser and Nagel, 2009) and that they remain flexible during coding to adapt to novel findings (Braun & Clarke, 2006; Liamputtong, 2009). GT researchers explore how an individual conveys meaning through language about a certain topic (i.e. challenges to emergency response) and look for commonly occurring patterns between participants that can contribute to theory. Thematic analysis follows a similar inductive process to GT (i.e. transcript, annotate, code, refine codes, organise codes and themes) (Lo, 2014); however, whereas GT aims to create a final theoretical model of the data (Glaser & Strauss, 1965), thematic analysis seeks to provide a detailed descriptive account that does not extend beyond the data set being explored. As the aim of this thesis was to use inductive techniques, but with the fundamental goal of developing theoretical hypotheses that could be tested at RQ2, then GT was deemed the most appropriate method for analysing the interview data.

2.5.2 Limitations of qualitative research

Despite the strengths of qualitative analyses for facilitating an exploratory understanding of real-world data, there are a number of limitations that must be acknowledged. There is a poor distinction between the different types of qualitative analyses, which can cause confusion amongst researchers (Bryant, 2002; Lo, 2014). It is not uncommon to find published papers that mislabel the qualitative methodology that has been used, with ‘grounded theory’ and ‘thematic analysis’ most often confused (Vaismoradi, et al., 2013). Ironically, the celebrated ‘flexibility’ of qualitative methods has inadvertently contributed to the incoherence of these methods as research mix methodological approaches (Holloway & Todres, 2003). As a result, qualitative data is commonly perceived as less scientific than more stringently defined quantitative techniques (Crandall, et al., 2006; Laubschagne,

2003). For example, different researchers can generate different conclusions about the same data set depending upon their ability, experience and research focus, which suggests subjectivity and bias in analyses (Gläser & Laudel, 2009). The variability in research conclusions deviates from traditional positivist approaches to psychology that treat objectivity, validity and reliability of results as benchmarks for research quality (Parker, 2008). Furthermore, as qualitative research is often time consuming and labour intensive, then these contributing negative factors can detract potential researchers from using qualitative methods (Hoffman, 1987).

Yet there has been a growing methodological interest in qualitative analyses over recent years. There has been an exponential increase in the number of qualitative publications in psychology journals; increasing from just 12 papers in 1990 to 529 in 2010 (Carrera-Fernandez, et al., 2014; Madill & Gough, 2008). Interest in the use of interviewing has grown, as traditional quantified techniques tend to reduce behaviour and cognitive processing to numerical values that arguably strip the data of its meaning (Bogner & Menz, 2002). Indeed, when research seeks to establish a rich understanding of the experienced cognitions and true psychology of individuals, such as NDM, it would seem that the “*whole is greater than the sum of its parts*” (p.108; Crandall, et al., 2006). Parker (2004) suggests that psychology should cut its philosophical ties to ‘science’ and instead draw strength from its flexible approach and ability to facilitate interdisciplinary work. Rather than trying to replicate science, psychology is perhaps better defined as the lynchpin that links science and human behaviour. Harre (2004) goes further to argue that qualitative analyses are in fact *more* scientific than quantitative methods as they are reflexive, meaningful and specific to the research topic. Furthermore, as researchers are people themselves, it has been questioned whether the claim of true objectivity is even possible, as every researcher will bring along their own ‘deductive’ research qualities that informs their analyses (Malterud, 2001).

2.5.3 Conclusions on qualitative data analyses

Qualitative approaches to data analysis are thus useful for providing rich, contextualised and in-depth conclusions on the psychological experience of individuals. A number of authors have attempted to outline more stringent descriptions and criteria for conducting qualitative research to improve the clarity in this methodological approach (e.g. Liamputtong, 2009; Lo, 2014; Morrow, 2005;

Tracy, 2010; Vaismoradi, et al., 2013). Furthermore, a number of recent papers have attempted to clarify the distinction between specific qualitative methods by outlining frameworks to facilitate analysis (e.g. Braun & Clarke, 2006; Carrera-Fernandez, et al., 2014; Liamputtong, 2009). Tracy (2010) outlines eight markers of good quality qualitative research by ensuring research has: (i) a worthy topic; (ii) rich rigor; (iii) sincerity; (iv) credibility; (v) resonance; (vi) a significant contribution; (vii) ethics; and (viii) meaningful coherence. Furthermore, Malterud (2001) defines relevance, validity and reflexivity as essential standards to ensure qualitative research quality. Qualitative conclusions can be bolstered by triangulating research to test conclusions in more quantitative and experimental settings (Madill & Gough, 2008; Parker, 2004). Indeed a mixed methods approach was used in the current thesis by embracing both qualitative CDM analyses (Chapters 4 & 5) coupled with more stringent quantitative assessment of questionnaires following the MTFA simulation (Chapters 6 & 7). The fourth and final section of this chapter will describe how advancements in technology can further enhance qualitative data analyses, via the use of NVivo.

2.6 Computer tools to facilitate qualitative data analyses: NVivo

NVivo is a computer package that can facilitate the analysis of qualitative data (Bazeley & Jackson, 2013). It enables the researcher to deal with voluminous, text-heavy and cognitively demanding data sets as it allows for data to be stored, updated and changed in electronic folders (Liamputtong, 2009; Yuen & Richards, 1994). NVivo does not *conduct* data analysis for the researcher, unlike statistical computer packages such as SPSS, but offers an organisational package that can *assist* the researcher with coding and categorising the data (Liamputtong, 2009). For example, the interviews for this thesis produced over 494,000 transcribed words. Although not impossible, hand coding such a large data set would have been very demanding on the researcher who would have to manually search between interview transcripts when referencing common themes. NVivo facilitates electronic search of transcripts, which is much faster and lessens demands on the researcher. Although NVivo is primarily used to analyse interview transcripts, it can also facilitate the analysis of other types of qualitative data including picture files and audio files (Bazeley & Jackson, 2013; Reavey 2011). The remaining section of this chapter will detail how

NVivo was utilised to facilitate the GT analysis of CDM interview transcripts in this thesis.

2.6.1 Creating a project in NVivo: Preparing data for analysis

The first step in qualitative data analysis involves preparing the data for analysis (e.g. transcribing). When using NVivo, this means creating a 'data project'. A data project is a computerised file in which all information about the project will be stored; much like a folder on a desktop computer. Not only does it store raw data and subsequent sorting and analyses, but it can also include documents that can help audit the research process. For example, it is recommended that researchers who use NVivo create an electronic 'journal', which is stored within the data project (Bazeley & Jackson, 2013). This acts as an electronic notebook where the researcher can document their thoughts, reflections and actions during the analysis process. It serves as a useful audit trail that the researcher can return to when self-monitoring and grounding their theoretical understanding of the data (Liamputtong, 2009; Mueser and Nagel, 2009). It also provides an appropriate place to store 'memos' that enhance the 'theoretical sensitivity' of GT analyses (Amsteus, 2014). During data preparation in NVivo, the researcher can also transcribe data from audio to written format. This can be done within NVivo itself or by importing a typed transcript from Microsoft Word. A total of n=31 interviews were transcribed in this thesis, which totalled to 51 hours, 18 minutes and 34 seconds of audio files with a mean length interview of 1 hour, 39 minutes and 18 seconds. During initial transcription for data preparation, the researcher made notes on preliminary emergent themes in preparation for GT analysis and coding.

2.6.2 Coding in NVivo: Creating nodes

Once data has been effectively prepared and organised (i.e. transcribed), it is then possible to begin coding the data. NVivo does not code the data for the researcher, but instead helps to organise codes electronically (Liamputtong, 2009). Codes are referred to as 'nodes' in NVivo, which the researcher can create, edit, delete or merge at any point during the analysis process. This was hugely advantageous during the GT analyses performed for this thesis, as it facilitated flexibility when identifying emergent themes. For the current thesis, each transcript was coded one at a time within NVivo; when an utterance within a transcript seemed

relevant and interesting (i.e. related to decision inertia), the relevant text was highlighted in the document and a 'new node' was created. Whenever a 'new node' was created, it was named with an identifiable label (e.g. 'lack of information') and a 'description' of the node's meaning was added to the file. The description box helped facilitate 'constant comparison' as a part of the GT process, as it was then possible to see how different nodes related to one another later in the analysis process. Once a 'node' has been created, subsequent text could be quickly coded into the node by highlighting the text and then dragging and dropping it into the node folder. It was also possible to review node content at any point during analysis by opening the node folder, which contained all the text that had been placed under that code. As nodes were stored electronically, it was possible to create a huge volume of nodes that allowed for wide and diverse coding. It also enabled multiple coding of the same portion of text into multiple nodes when required.

2.6.3 Refining codes in NVivo: Parent nodes

Once the initial coding of transcripts was completed, the next phase of GT involves the refinement of nodes through constant comparison (Amsteus, 2014). In NVivo this process involved the creation of 'parent nodes'. Parent nodes are top level themes under which relevant codes are stored. Parent nodes effectively act as 'themes' in GT analyses, which are broken down into further 'sub-themes' and 'codes'. The creation of 'parent nodes' (i.e. themes) facilitates the early consideration of the final theoretical argument; a fundamental aim of GT. NVivo is especially useful for inductive analysis, as the researcher may create 'miscellaneous' parent nodes under which to store emerging and unusual themes for later analysis. For example, the researcher of this thesis was able to code data relating to both goal orientation (Chapter 4) and uncertainty (Chapter 5) at the same time by creating separate parent nodes that focussed on each of these specific areas.

2.6.4 Knowledge Representation: Concept maps

In addition to facilitating the *analysis* of qualitative data, NVivo can also assist with *knowledge representation* via the creation of visual models. Depending upon research requirements, NVivo can produce basic frequency data with reference to both textual data and coding. For instance, it is possible to generate 'word trees' that identify the words in the transcripts are commonly linked to one another. NVivo can

also visually display the most common nodes within the data set. It is also possible to tag interviews (e.g. Fire and Rescue interviews; Police interviews; Ambulance interviews) and produce frequency data to compare trends across data sets. There is also a wide range of graphic and visualisation tools that can be utilised to build concept maps; a recommended format for CTA knowledge representation (Crandall, et al., 2006). Thus, NVivo is an example of a useful technology that can facilitate qualitative research by enabling researchers to explore large data sets in a robust and systematic fashion.

2.7 Conclusion

This chapter has described a number of methodological issues that are relevant to this thesis. Firstly, it provided an overview of the key methodological challenges associated with real-world research relating to: (i) access to real-world data; (ii) designing and collecting real-world data; and (iii) analysing real-world data. It then described how the NDM paradigm offered a useful and scientific solution to research in real-world settings, with a specific focus on CTA. It provided an overview of how CTA facilitated three phases of psychological research, from knowledge elicitation to data analysis and knowledge representation, and specifically outlined the CDM interview technique that was used. The strengths and weaknesses of qualitative data analyses was explored, followed by a more detailed description of GT as the chosen qualitative analysis technique used to analyse interview data in this thesis, to generate an *emergent* model of the *cognitive processes* associated to decision inertia in emergency service contexts. In sum, there are three criteria that must be met in order to fulfil the requirements of a CTA project: (i) it must lead to a new discovery; (ii) this discovery must be sufficiently communicated to the end users; and (iii) the communication of discovery must have an impact and be put into action (Klein & Militello, 2001). The methods used in this thesis seek to achieve these goals by: (i) discovering the causes to decision inertia in emergency incident contexts; (ii) communicating these findings through the chapters of this thesis; and (iii) outlining key recommendations for how command level decision making might be improved.

Chapter 3: Commitment issues: A taxonomic classification of decision inertia and failures to act

3.1 Abstract

When presented with a set of options, people sometimes fail to act. This is especially prevalent when decisions are made in high-stake, high-risk contexts. This chapter argues that although it is important to understand why, how and when people do make decisions, it is also important to understand why, how and when they do not. This examination of ‘non behaviour’ is in contrast to the plethora of research that has widely focussed on the outcomes (and quality) of decision implementation. This chapter presents the results of a ‘critical interpretive synthesis’ of the literature, a specific type of literature review that seeks to incorporate both quantitative and qualitative research papers to help interpret new and novel theories (Dixon-woods et al., 2005; 2006a; 2006b; Flemming, 2009). It identifies three ways one may fail to act. ‘Decision avoidance’ is the *active* avoidance of choice, as individuals consciously opt to disengage with choice. This contrasts with ‘decision inertia’ - the *passive* avoidance of choice through redundant and persistent effortful deliberation between options. ‘Implementation failure’ is the behavioural manifestation of inaction by failure to execute action despite cognitive commitment (i.e. selecting an option). It incorporates antecedents that may contribute in explaining the causes of inaction. The taxonomic classification of ‘non decision making’ represented in this chapter is the first of its kind to describe different variations of failures to act and provides the foundation for which subsequent data chapters for this thesis were based.

3.2 Introduction

3.2.1 Defining decision inertia

A decision is a commitment to a course of action that is taken in order to achieve a desired goal (Yates, 2003). However, in uncertain and pressurised environments, decision makers often fail to commit to and implement action either in time or at all (van den Heuvel, Alison & Crego, 2012). This is especially the case when responding to emergency incidents and major disasters. For example, the emergency response to the Boxing Day Tsunami in 2004 was criticised due to delays in

providing the relatives of missing people with information about their loved ones (National Audit Office, 2006); following the devastating earthquake in Haiti in 2010, the response was criticised for being too slow due to weak humanitarian leadership (Grunewald, Binder & Georges, 2010) and poor prioritisation of relevant information (Patrick, 2011); and uncertainty concerning roles and responsibilities and a lack of leadership were blamed for causing delays in the response to widespread flooding in the UK in 2012 (PEDU, 2012). Indeed failures to act can arise, not only when incidents are constrained by temporal pressures, but further when the stakes or consequences are high and the situation is complex; for example, the widely reported and tragic death of the toddler ‘Baby P’ in 2007 in the UK was blamed on the failure of social care workers to properly consider and act upon the information they had regarding his abuse (Campbell, Jones & Brindle, 2008); and the government has been criticised for failing to take action and ignoring social moral issues when they are perceived to be low on the political agenda (McKee, 2011). Consider also the decision faced by President Obama and the United States Government with the eruption and escalation of violence in Syria:

“Do nothing, and a humanitarian disaster envelops the region. Intervene militarily, and risk opening Pandora’s box and wading into another quagmire like Iraq. Send aid to the rebels, and watch it end up in the hands of extremists. Continue with diplomacy, and run head first into a Russian veto. None of these approaches offered much hope of success”.

Clinton (2014, p.461)

Failures to act can arise due to antecedents associated with the situational characteristics of the decision environment, such as time pressure and complexity, or can further be a product of exogenous factors associated with the experience and traits of the decision maker and/or the decision making team (Alison, Power, van den Heuvel & Waring, 2014). People fail to act when faced with a range of decision contexts; from personal decisions about whether to buy a house; to organisationally relevant decisions across domains as diverse as emergency response (whether to commit a crew of fire fighters into an unstable, collapsed building) or retail (whether to invest money in opening another 40 supermarkets based on current income

expenditure models). Rather than commit to a choice, individuals delay their decision as they redundantly deliberate over their options (Eyre, Alison, McLean & Crego, 2008). This could involve deliberation on decision outcomes in the present, concerning which option is best or which is least worse (Parker & Schrift, 2011), or involve the anticipated potential negative consequences of future outcomes (Beeler & Hunton, 1997) such as being held to account for making a wrong decision (Mamhidir, Kihlgren & Sorlie, 2007) or experiencing salient aversive emotions such as regret (Ritov & Baron, 1995).

The research on failures to act is sparse; yet its conceptual importance and real world impact is not insignificant. It is distinct from the literature on cognitive biases and heuristics as it is not concerned with *wrong* or *irrational* judgements, but rather with the failure of individuals to reach choice conclusions. The paucity of research that has been conducted has primarily focussed on tight experimental settings in relatively low-stake decision making contexts, such as looking at why consumers may defer or avoid purchasing decisions in hypothetical decision scenarios (e.g. Novemsky, Dhar, Schwarz & Simonson, 2007; Parker & Schrift, 2011; White & Hoffrage, 2009); and is often methodologically questionable due to limited efforts to extrapolate the differences between, for example, avoiding choice and the decision to say 'no' (Huber, 1995). The application of these findings to the real world is questionable, as studies rarely account for the vast number of confounding variables that influence real-life decisions and are external to the decision problem (Anderson, 2005). For example, decision studies tend to assume that when a decision maker considers past negative experiences or anticipated consequences in their choice, then their decision making is 'biased'; yet this may actually be a very rationalised process reflecting how an individual has 'learned from past mistakes' (Tykocinski & Ortmann, 2011). Scholars must extend the conceptual validity of research on decision making by asking why implementation failure occurs. It is not enough to only explore the reasons why and under what conditions individuals behave (decide) with regards to given stimuli, but we must also find out why people may respond to stimuli by *not* behaving (indecision).

3.2.2 What is known about non-decision making?

Anderson (2003) was one of the first authors to discuss the importance of failures to act in his detailed review of decision avoidance. He defined decision avoidance as '*a tendency to avoid making a choice by postponing it or by seeking an easy way out that involves no action or no change*' (p. 139) and described its antecedents as deriving from both emotional and rational roots. The concept of choice avoidance was furthered van den Heuvel et al (2012), who identified that, in team based settings, actions failed not only as teams sought to avoid making their choice, but also because they failed to translate cognitive choices into the behavioural implementation of action. Research on inaction in organisational management has also found that organisations may fail to act by choice deferral, or by simply failing to reach a choice conclusion (Brooks, 2011).

The taxonomy presented in this chapter extends previous works. Specifically, it aims to: (i) conceptually define and describe the different ways one may 'fail to act'; and (ii) present theoretical antecedents, derived from the literature, that may help explain these failures in cognitive processing. Crucially, it considers why action may fail, even when people are *motivated to make* a choice, yet for reasons that will be discussed, fail to translate that motivation into action. This chapter presents three types of action failure: (i) 'Decision avoidance' - a maladaptive cognitive process whereby the decision maker *actively* avoids thinking about whether to commit to action (e.g. "I choose not decide for the time being"); (ii) 'Decision inertia' - a maladaptive cognitive process whereby the decision maker *passively* avoids choice as they are distracted by cognitive conflict (e.g. "I am still thinking about whether I will commit to, refuse or avoid this choice"); (iii) 'Implementation failure' - the third type of avoidance, which reflects the maladaptive *behavioural* process whereby the decision maker fails to translate their choice into action (e.g. "I have made my choice but efforts to execute / implement this choice have failed"). All three describe behavioural inhibition, yet, crucially, the motivation behind each form of inaction differs. Some are avoiding their choice by deciding to ignore it, whilst others are still deliberating their choice; and others have made their choice but failed to execute it. The significant contribution of this chapter is to encourage psychological enquiry into the action failure phenomenon by helping to better define the concept of action failures.

3.3 Method

3.3.1 Aims and Scope

The aim of this chapter was to provide a theoretical foundation to this thesis. It extends the conceptual validity of research into decision making; specifically by considering the reasons why people fail to act (decide) in response to a given stimulus. It presents a detailed review of the literature, using a methodology that is specifically oriented towards the *generation* of theory by maintaining a *flexible* approach. The ‘critical interpretive synthesis’ (CIS) literature review process was chosen as, although less well known and mainly derived from health research, it is specifically designed to explore *new and novel concepts*, by synthesising *both* quantitative and qualitative literature and, importantly, *interpreting* findings through a theoretical lens (Dixon-woods et al., 2005; 2006a; 2006b; Flemming, 2009). This process helped to produce the resultant taxonomic classification of failures to act.

3.3.2 Procedure

A five step CIS process was followed in order to assemble the relevant literature on the psychology of inaction, whilst generating a theoretical knowledge synthesis to explain this phenomenon. A detailed description of this procedure is provided in Table 3.1. The CIS method ‘*is sensitised to the kinds of processes involved in a conventional systematic review, whilst drawing on a distinctively qualitative tradition of inquiry*’ (p. 9, Dixon-Woods et al., 2006a). It helps the researcher to interpret the literature through a theoretical lens and, perhaps most importantly and in contrast to traditional literature review methodologies, allows for the inclusion of both quantitative and *qualitative* papers. By incorporating qualitative research, which is more interpretative and theoretical by nature, the researcher is able to focus less on what is already *known* about a concept, and instead develop new insight on what remains *unknown*; enabling the generation and construction of novel theory. The CIS procedure is flexible, and researchers can adapt the ordering of the five step process in response to accumulated findings; for example, using referencing chaining to discover new literature. This differs to more traditional *aggregative* review formats (e.g. systematic reviews, meta-analyses), that involve inflexible procedures with strict inclusion and exclusion criteria (Flemming, 2009); and encourages adaptation to *both* aggregative quantitative research and interpretive qualitative research. Thus

although Table 3.1 helps describe the general procedure followed in this chapter, the order of these steps is not linear.

Table 3.1: A five step critical interpretive synthesis procedure

Steps (1-5)	Action
1) Define the review question	<ul style="list-style-type: none"> • Establish a holistic and broad question on your topic • Treat the question as a compass rather than an anchor by iteratively refining it as you progress
2) Search and sample the literature	<ul style="list-style-type: none"> • Establish initial search terms • Use multiple literature sources (electronic, reference chaining, unpublished work) • Be ‘selective’ rather than ‘sensitive’ in order to focus on the phenomena • Sampling should be both purposeful (relevant to phenomena) and theoretical (relevant to theory)
3) Appraise the literature and extract recurring concepts	<ul style="list-style-type: none"> • Use a data extraction form (see Appendix for example) to appraise papers • Critique each paper’s theoretical relevance • Identify recurring concepts
4) Synthesise appraisals	<ul style="list-style-type: none"> • List all concepts found in the literature • Refine list by synthesising related concepts • Establish a set of new synthetic constructs which help to group, explain and distinguish the phenomenon
5) Create theoretical model	<ul style="list-style-type: none"> • Generate a synthesising argument of your topic (e.g. theoretical taxonomy)

3.3.3 Search criteria

An online search of the DISCOVER database was conducted between the months of April and October 2013. Reference chaining was performed from the papers that were identified in the online search, and in the subsequent months leading up to the final write-up of this chapter in June 2015. Keywords were drawn from Anderson’s (2003) rational-emotional model of decision avoidance as this was a seminal paper of interest. Keywords included ‘decision inertia’; ‘decision avoidance’; ‘implementation failure’; ‘choice deferral’; ‘sunk-cost effect’; ‘omission bias’; and ‘inaction inertia’. Inclusion criteria for papers were kept wide but selective in order to synthesise the available literature on failures to act across topic domains. Papers that described failures to make or implement choice and decision avoidance mechanisms were of particular interest. Papers that discussed choices that were high

consequence and irreversible (or very difficult to reverse) were also valued. Papers were excluded if they focussed on procedural or non-human decision making as these were not seen to represent high stakes or high consequence decision making involving cognitive deliberation. It is worth noting that a literature review will inevitably miss areas of research, as there may be specialised areas of research that are not identified within the chosen search terms. Yet this chapter did not aim to provide a complete and final taxonomy of action failure. Instead it hoped to provide a theoretical foundation upon which to build further psychological enquiry, and thus this is an acknowledged and anticipated limitation.

3.4 Results

A total of 329 papers were identified from the initial search. After reading the abstract of each paper, 106 papers were selected for full review (Table 3.2). Full review involved systematically reading the paper in its entirety and using the data extraction form (Appendix Two). There is no standardised data extraction template currently available for this type of analysis and so a format was generated for this chapter. Other researchers are encouraged to use this template to facilitate their own CIS literature reviews, and to systematically document general reading. The data extraction form detailed each paper's reference; aims; method; key findings; second order constructs (i.e. psychological terms); and their fit to the synthesising argument (i.e. theoretical model). An example of the layout of this table can be seen in the Appendices (Appendix Two).

Table 3.2: Frequency details of all papers identified and selected for review

Search terms	Number of papers found	Full papers reviewed
"Decision inertia" OR "Decision avoidance"	31	6
"Implementation failure" AND "Decision making"	10	2
"Choice deferral" AND "Decision making"	46	13
"Sunk cost effect" AND "Decision making"	72	15
"Omission bias" AND "Decision making"	95	28
"Inaction inertia" AND "Decision making"	75	17
<i>Grey literature</i>		25
Total:	329	106

3.4.1 Outlining the model

3.4.1.1 What decision types is the model interested in?

By combining the experience of the researcher along with what is known in the literature on errors in decision making, this chapter sought to explore papers on the challenges to decision making. It is worth noting that although this chapter presents findings derived from the CIS, it was also heavily influenced by the ethnographic experience of the researcher and her supervisor who has researched high-stakes decision making for almost two decades. As a result, the strengths of this review lie not only in reporting the available literature, but also in the expert knowledge of the psychologists who have observed this phenomenon over the many years that they have worked in close collaboration with high stakes decision making practitioners, who commonly refer to and have experienced action failures and inertia. This combination of experience and literature resulted in a taxonomy that classifies the avoidance of decisions into three categories; namely that people will avoid challenging decisions by intent (decision avoidance); through cognitive conflict (decision inertia); or through behavioural difficulties in manifesting action (implementation failure). A ‘challenging decision context’ was defined according to Orasanu and Connelly’s (1993) definition, as ill-structured; uncertain and dynamic; poorly defined and/or competing goals; action and/or feedback loops; time stress; high stakes; multiple players; and with organisational goals and norms. Of course decisions that result in action failure will not always have all eight ‘challenging’ characteristics present (Orasanu & Connelly, 1993), but they do all represent decisions with large and irreversible (or at least very difficult to reverse) consequences for the decision maker once they have made their choice. Fundamentally, the types of decisions of interest are those that are high-stakes, with hard, if not impossible to calculate short, medium and long-term consequences that make decision making difficult.

3.4.1.2 What does the model include?

This chapter not only identifies the different *types* of action failure (avoidance; inertia; implementation failure), but also describes the antecedent reasons for *why* action may fail (Figure 3.1). Decision making incorporates the consideration of a whole range of factors external to the decision task (e.g. personal circumstances),

and thus when exploring decision making outside of the tight control of the laboratory it is important to consider these elements (Huber, 1995). Results will now be discussed in full, by firstly defining each of the three types of action failure.

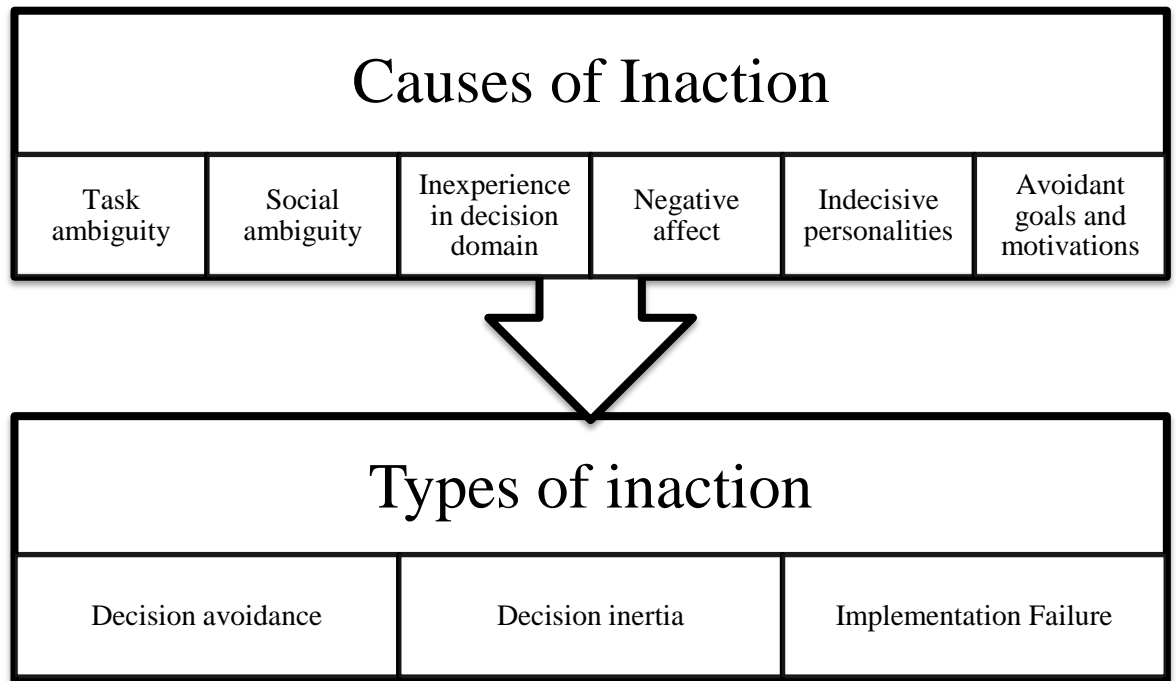


Figure 3.1: A Taxonomy of Action Failure

3.5 A model of action failure

3.5.1 Decision avoidance

Decision avoidance is *‘the tendency to avoid making a choice by postponing it or seeking an easy way out that involves no action or no change’* (Anderson, 2003: p.139). It is a decision in itself, as the individual opts to disengage with decision processing rather than evaluate their choice. For example, in the context of emergency response to a multi-car road traffic collision, the commander of an ambulance team may decide to avoid (or postpone) their choice on which casualty to prioritise as they believe there is no point thinking about it until they receive further information from their crews. The commander has decided to avoid their choice for the time being. According to Anderson’s (2003) original definition, decision avoidance is operationalised in three ways: by maintaining the ‘status quo’ (i.e. “I will go along with the majority”); by ‘choice deferral’ (i.e. “I will postpone my

choice for now and wait and see what happens”); or by ‘omission’ (i.e. “I will not think about this choice”). Decision avoidance is fundamentally driven by a motivation to avoid cognitive processing. It is the decision to avoid making a decision for the time being.

Individuals are motivated to avoid approaching a stimulus (i.e. decision) if they associate it with negative (anticipated) affect (Elliot, 2006). Motivation is central to emotional regulation (Elliot, Eder & Harmon-Jones, 2013) and acts as the driving force that energises and translates cognitions into directed action. This means that when faced with challenging decisions associated with (potential) negative affect, cognitive and affective processes interact to motivate the individual to either approach or avoid the difficult choice. The mere presence of salient (positive or negative) emotions can reduce the likelihood of action as decision makers refuse to accept trade-off between equally attractive (or unattractive) or highly valued (or devalued) options (Dhar, 1997; Tanner, 2009); thereby avoiding cognitive deliberation. Once an individual is motivated to avoid a stimulus (or choice), then additional stressors in the environment such as time pressure can further degrade decision making (Roskes, Alliot, Nijstad & De Dreu, 2013); when decisions are hard to avoid, negative emotions increase and choice is perceived as more complex (Mamhidir, et al., 2007). Thus the interaction between negative affect and complexity can stimulate avoidant motivations.

Avoidance motivation is caused by stressors in the decision environment that are linked to negative emotions. For example, regret has been associated with ‘inaction inertia’ in consumer choice contexts, whereby individuals are biased against taking action, due to negative emotional salience anchored to ‘missed opportunities’ (Sevdalis, Harvey & Yip, 2006). Avoidance arises due to the increased demands on the systematic processing of the decision maker, which can have especially large negative impacts when the decision task requires insight and creativity (Sligte, De Dreu & Nijstad, 2011). This is important for high-stakes decision making, as the context of such choices will be novel and require creative and dynamic thought. Not only can avoidance arise as a product of negative stimuli; but it can also occur as a stable trait-based characteristic (Harmon-Jones, Harmon-Jones & Price, 2013). This suggests that stressors act to both cause and exacerbate avoidance tendencies in decision making, and that certain individuals may be intrinsically avoidant. Thus,

decision avoidance occurs when individuals are motivated to avoid making a choice due to the experienced and/or anticipated negative affect that is associated with the choice. It fundamentally represents the desire to disengage and avoid a choice by deferring/postponing the choice or by completely omitting it from further cognitive deliberation.

3.5.2 Decision inertia

Decision inertia is the most psychologically interesting type of failure to act as it is associated with internal cognitive conflict. It is defined as *the redundant cognitive deliberation of choice for no positive gain* (for an example see Alison, Power, van den Heuvel, Humann, Palasinski & Crego, 2015). What makes inertia distinct from avoidance is that the decision maker continues to think about the choice, rather than choosing to ignore it. It differs from the adaptive process of sensemaking as, paradoxically, cognitive processing will not help the decision maker in reaching a choice as there is little or no more information available. The decision maker is cognitively inert as they are fixated on a trajectory of continual revaluation and assessment of the situation in order to try and trade-off salient competing options, goals and anticipated potential consequences. As is the case with decision avoidance, inertia is likely when the decision environment is characterised by complexity (Kopylov, 2009), competing options and preferences (Roswarsky & Murray, 2006) and salient negative affect (Dhar, 1997). Yet rather deciding to avoid choice, individuals continue to deliberate over their options. They continue to try and resolve their decision, even when no more useful information is available.

Once again it is possible to turn to the literature on motivation to further develop this concept. As outlined, individuals are motivated to avoid stimuli when they are associated with negative affect and/or cognitions (Elliot, 2006). A unique feature of inertia is that individuals fail to act, not as they are motivated to disengage and avoid a choice, but because they are motivated to avoid loss (Corr & McNaughton, 2012). Inertia is not driven by adaptive approach motivations (i.e. energising behaviour towards positive stimuli), but instead reflects internal cognitive dissonance as individuals try to select the ‘least worst’ potentially negative outcome. Interestingly, ‘least worst’ avoidance motivations have been associated with *increased* action as individuals tend to *over-react* and take precautionary action as they would rather be

‘better safe than sorry’; for example, Dekay, Patino-Echeverri and Fischbeck (2009) found individuals favoured action to close a hypothetical major airport due to weather risk rather than keep it open. Importantly however, these forced choice contexts are rare in the real-world, as decision makers are seldom bounded by ‘now or never’ forced choice contexts. Indeed the manager of a real airport may continually delay their choice as they seek and hope for further information to make their decision easier, and in doing so pass an unanticipated point of no return where action is no longer possible. Fundamentally, the likelihood of action results from the interaction between a desire to avoid potential anticipated negative consequences, the anticipated potential for further information and the practical characteristics of the choice context.

Avoidance motivation has been further unpacked by Corr, DeYoung and McNaughton (2013) who identified two avoidance systems: one relating to *active avoidance* whereby the decision maker takes action to escape a negative stimulus; and the other relating to *passive avoidance* whereby the decision maker shows behavioural inhibition due to goal conflict. This chapter suggests that decision avoidance reflects *active* avoidance motivation as decision makers seek to escape the choice context by deciding to avoid (or postpone) their choice for the time being; compared to decision inertia that can be linked to *passive* avoidance and behavioural inhibition due to goal conflict and cognitive deliberation (Corr et al., 2013). This creates potential for further research at the neurobiological level as passive and active avoidance have been associated with activation in different regions of the brain (Gray, 1990). Passive avoidance is associated with the Behavioural Inhibition System (BIS) and associated anxiety whereas active avoidance is associated with panic and activation of the Fight, Flight System (FFS) (Corr et al., 2013). Furthermore, activation of the BIS has been linked to the behavioural economics concept of ‘loss aversion’ (i.e. the disproportionate desire to avoid losses) (Corr & McNaughton, 2012). Loss aversion is associated with poor decision making as the overwhelming desire to avoid loss distracts decision makers from more rational processing of choice (Kahneman, 2003), by focussing on anticipated negative emotions (e.g. regret) and difficulties in objectively trading off options and/or values (Tyocinski, Pittman & Tuttle, 1995). Arguably, decision inertia may reflect a maladaptive cognitive processing strategy that is rooted in passive avoidance

motivations, which are associated with loss aversion and activation of the BIS. This offers an exciting possibility for research to see how observational evidence of inertia in, for example, multi-agency command meetings, interacts with physiological measures associated with motivational drives and neurobiological activity in the brain.

The difference between avoidance and inertia may further be explained by perceived distance (both physical and psychological) of negative stimuli or threats. It has been found that stimulation of the FFS and active avoidance tends to arise when individuals perceive threatening stimuli/consequences to be either physically or temporally imminent; whereas activation of the BIS and passive avoidance is more likely when threats are perceived to be more distant in space or time (Corr, 2013). This means that a key difference between inaction via decision avoidance compared to decision inertia may be linked to the perceived proximal or temporal distance of anticipated negative stimuli. Specifically, decision avoidance may be more likely when potential negative consequences are seen to be nearby or imminent, whereas decision inertia would be more likely when negative consequences are more distant.

Interestingly, people from individualist (i.e. Western) cultures, who tend to focus on short-term goals are more likely to avoid choice, whereas those from collectivist cultures look further into the future and are more likely to take action (Carmona, Iyer & Reckers, 2011). This links with findings on emergency response decision making, as those who were not guided by wider strategic goals (i.e. long-term thinking, bigger picture) were more likely to fail or coordinate action (Alison et al., 2015). It is worth noting the inconsistencies between behavioural and neurobiological data, as behaviourist studies suggest long-term goals facilitate action (Alison et al., 2015; Carmona et al., 2011); whereas neurobiological research suggests distant goals activate the BIS and thus induce cognitive goal conflict and deliberation (Corr, 2013). These differences may be moderated by the decision making context, for example; strategic decisions that require more deliberate and slow-time thinking may be *facilitated* by distant thinking; whereas more time pressured sub-tasks are *distracted* by distant focus. It is important to extrapolate these findings to help develop the conceptual validity of decision avoidance and inertia. It is suggested that the limited previous decision making literature on failures to act has collapsed both inertia and avoidance into one general concept of

avoidance, whereas the motivational literature has made progress in distinguishing the different types of avoidance. This chapter combines these efforts to extend the understanding of general avoidance further.

3.5.3 Implementation failure

A final form of action failure is termed ‘implementation failure’. This type of ‘non decision’ is distinct from avoidance and inertia as it reflects the *behavioural* manifestation of action failure, as opposed to the *cognitive processing* associated with action failure. It describes the situation where a decision maker has cognitively committed to action and made a choice, but fails to execute / implement it at a behavioural level. For example an individual may decide to quit their job, but never find the right moment to tell their boss; or a police commander may decide to host an on-scene multi-agency meeting, but the message doesn’t get passed on to relevant others. Dhar (1997) found that a lack of time pressure can cause ‘action inertia’ whereby decision makers fail to execute plans. In multi-agency emergency response command teams it was found that lack of time pressure increased redundant information seeking and distracted from adaptive discussions on action (Alison, et al., 2015). As such, implementation failure is not so much a *psychological* cause of action failure, but describes a coordination breakdown between cognitive commitment to a choice and behavioural action at the individual or team level.

The main area of research that has thus far explored implementation failures is research within the domain of organisational psychology. Poor team structure, a lack of organisational cohesion and ineffective team management all derail plan execution (Decker, Durand, Mayfield, McCormack, Skinner & Perdue, 2012; Taleai & Mansourian, 2008). Research exploring high-stakes police team decision making found that action can fail despite cognitive commitment to a choice by the collective team due to poor coordination and communication (van den Heuvel et al., 2012). Although less attention will be paid to this third form of action failure, as it is a product of poor *behavioural* management rather than *psychological* processing, it is important to acknowledge it as a type of action failure, especially as it has been found to occur in high-stakes and strategic decision making teams (Decker et al., 2012; Taleai & Mansourian, 2008; van den Heuvel et al., 2012).

3.6 Why does action fail?

This chapter has identified six antecedent factors that may contribute the likelihood of inaction. Namely, action fails when decision making is challenged by factors including: (i) situation uncertainty; (ii) social uncertainty; (iii) inexperience in the decision domain; (iv) negative affect; (v) indecisive personalities; and (vi) avoidant goals and motivations (Figure 3.1). To recap, decision making is the process of selecting an action that can facilitate the achievement of a goal in an uncertain environment (Hastie, 2001). The aim of decision making is to select the option that is most appropriate for solving the decision problem in line with associated goals. Most decision process models suggest a general pattern of identifying or generating potential options, deliberating on the appropriateness of these options and then deciding upon and implementing a choice (Fellows, 2004; van den Heuvel et al., 2012). Decision making fails when individuals struggle to follow this process. This chapter will now explore six main causes that seemed to contribute to decision derailments. Each antecedent may influence inaction directly, or interact with one another to contribute to action failure.

3.6.1 Task Ambiguity

Choices are made more difficult when the problem environment is characterised with a variety of synonyms that refer to ambiguity. This can occur when there is high similarity between options, when information about options is ambiguous and when an individual is unsure of their threshold of acceptable choice (Chen, Ma & Pethel, 2011; White & Hoffrage, 2009). Individuals will try to adapt their cognitive processing in order to reduce cognitive load and lessen the demands of mental accounting (White & Hoffrage, 2009). Typically, ambiguity increases when the decision environment is high risk (Bond & Nolan, 2011; Decker, et al., 2012; van Putten, Zeelenberg & van Dijk, 2007) and complex (Huber, 1995; Patrick, Lancellotti & Hagvedt, 2009); with a high number of poorly defined options (Brooks, 2011; Dhar, 1997; Roswarski & Murray, 2006; Tversky & Shafir, 1992); and potential negative and irreversible outcomes (Asch, Baron, Hershey et al., 1994; Patrick, Lancellotti & Demello, 2009; Tykocinski & Israel, 2006; Zeelenberg, van Dijk, Manstead & van der Pligt, 2000). For example, a commander's situational awareness at a road traffic collision will be inhibited if there were unknown numbers

of casualties with unknown injuries, and if there was a lack of information over whether specialist equipment would arrive in time. A lack of information on the decision problem has been associated with implementation failure in organisational team settings (Taleai & Mansourian, 2008), and time pressure can degrade decision quality as decision makers perceive the decision challenge to be more difficult (Kozup & Creyer, 2006).

Task ambiguity therefore derails choice because it limits the decision maker's ability to make sense of the situation and prospectively model future states (Klein, Snowdon, & Pin, 2007; Lipshitz & Strauss, 1997; van den Heuvel, et al., 2012). An accurate understanding of the situation is vital to effective decision making, as the decision maker's understanding of the choice environment informs the way that they will process their choice and their ability to anticipate consequences associated with different options and courses of action. The visualisation of future states is an important influence on behaviour. For example, parents were found to irrationally avoid vaccinating their child when they were unable to visualise positive future consequences but instead anticipated uncontrollable and irreversible risk (Bond & Nolan, 2011). In managerial decision making, it has been found that perceived uncertainty and risk caused implementation failure as managers would rather withdraw from choice commitment than take risky action (Brooks, 2011; Decker et al., 2012). Task ambiguity can increase the perception of risk and increase the anticipation of (faulty) negative outcomes. Indeed, task ambiguity is related to 'endogenous' uncertainty, which is a product of unknowns associated with the decision problem, and has been found to derail decision making in high-consequence environments (e.g. Police hostage negotiation; Alison, et al., 2014). Endogenous (task) uncertainty stops action as decision makers lack confidence in their assessment of the situation and thus are unwilling to take (potentially) risky action.

3.6.2 Social Ambiguity

Alison et al (2014) found that uncertainty in high-stakes environments not only emerged from task ambiguity, but was also linked to the social and team environment. They termed this 'exogenous' uncertainty, and found (in their study on Police hostage negotiation training) that it was three times more prevalent than 'endogenous' uncertainty, and qualitatively associated to poor role understanding

and trust (Alison et al., 2014). Social ambiguity thus contributes to overall uncertainty in high-stakes environments. Real-world choices are rarely taken without other relevant decision makers or advisors. Indeed, '*organizations that rely heavily on decisions made by groups may have an in-built tendency to inertia and resist change*' (p.251, White, Hafenbradl, Hoffrafe, Reisen & Woike, 2011). For example, Police, Fire and Ambulance commanders must make decisions as a coordinated team to facilitate effective emergency response by relying on information from others, whose role in providing that information must be trusted and unambiguous. The mere presence of social others creates social ambiguity and uncertainty, as individuals will erroneously deliberate on their choice whilst monitoring the choices of others (van Harreveld, van der Pligt & Nordgren, 2008). Individuals experience more regret when comparing themselves to disliked social referents (Kumar, 2004), which may increase anticipated risk and failures to act. Furthermore, a study found that when *teams* were presented with a task, then 50% chose to defer their choice, compared to only a tenth of individual decision makers (White, et al., 2011). The concept of 'implementation failure' is a key barrier to organisational decision making, as even when a choice has been made, the execution of action can fail at a behavioural level due to poor team structure (Decker et al., 2012; Taleai & Mansourian, 2008).

A culture of mistrust can derail action as individuals waste their time considering the integrity of social others, rather than focussing on the task at hand (Alison et al., 2015; Bond & Nolan, 2011; Mamhidir, et al., 2007). Poor trust reduces information sharing and the willingness to accept advice from others (Bond & Nolan, 2011; Jehn & Mannix, 2001; Leifer & Mills, 1996). Inaction further arises when one expects to receive feedback on their decisions (Zeelenberg & van Dijk, 1997) due to the salience of anticipated loss (Crotty & Thompson, 2009), the anticipation of blame (Eyre, et al., 2008; Zeelenberg, et al., 2000), and the perceived inability to personally justify choice (Beeler & Hunton, 1997; Brooks, 2011; Dhar, 1997; Tykocinski & Pittman, 1998). As such, when individuals mistrust their team members, who they rely upon for essential information to inform their choices, then they will feel more exposed and less willing to act (Mamhidir, et al., 2007). Social uncertainty relating to mistrust prevents action as individuals focus their attention

towards assessing the trustworthiness of advice/information, rather than the decision task.

Confusion about one's own and others' social roles also degrades action and contributes to social uncertainty in team settings (Alison et al., 2014). Team decisions involve a variety of individuals who each have different roles, responsibilities and experience in the decision domain (Nohrstedt, 2000). However, when individuals misunderstand their own role and hold erroneous expectations about the responsibilities of others, then this can degrade trust and increase frustration (Rake & Nja, 2009). Decision making is impeded when there is a poor understanding of role distribution (House, Power and Alison, 2014; Alison et al., 2014) or a lack of general organisational structure (Decker et al., 2012; Taleai & Mansourian, 2008). Poor interpositional knowledge, when one is unsure of how they fit into the social environment, reduces action as team members are reluctant to take responsibility for decisions that they do not perceive as their own (Budescu & Rantilla, 2000; Decker et al., 2012; Taleai & Mansourian, 2008). Role ambiguity makes decision makers both unwilling and unaware of their own and others' responsibility and ability to implement a choice. Understanding other team members' roles is important, as it has been found that when decision makers imagine themselves in another's role then decision making improves (Zikmund-Fisher, Sarr, Fagerlin & Ubel, 2006). Thus, social ambiguity appears to be related to the increased likelihood of inaction.

3.6.3 Inexperience in the decision domain

It has been well documented across a number of studies that domain-specific experience facilitates decision making (Klein, Calderwood & Clinton-Cirocco, 1986). The more experience an individual has, the less likely they are to perceive risk or experience dread associated with choice (Bond & Nolan, 2011). Experience enables decision makers to efficiently process their choice even when the task is complex (Bornstein, Emler & Chapman, 1999; Braverman & Blumenthal-Barby, 2012). This is because they have relevant *task-specific knowledge* which reduces cognitive bias, which is more important for decision effectiveness than *general knowledge* associated with intelligence (Stanovich & West, 2008). Experts use 'gut instinct' and intuitive knowledge (Klein, et al., 1986); relying upon accurate implicit

and explicit ‘recognition primed’ mental models, developed through repeated exposure in the choice environment, to help guide their choice (Klein, 2008; Roswarski & Murray, 2006). Rather than having to analytically process choice in a demanding decision environment, experienced decision makers can cope with increased task demands as they use intuitive and learned responses.

Experts are also able to recognise when they do *not* know how to respond (Kahneman & Klein, 2009). This is important for the concept of inertia; rather than redundantly deliberate over a choice, an expert is able to recognise the need to adapt their decision strategy (e.g. adapt to attribute-based satisficing strategies when the situation is unfamiliar and/or time pressured). Inexperienced decision makers may be more at risk of decision inertia as they continue to use highly selective search strategies resulting in the redundant and inefficient deliberation of options. Indeed, Police officers, who were asked to investigate a fictitious case, were found to adapt their decision making when placed under time pressure by using more time efficient satisficing strategies when generating hypotheses (Alison, Doran, Long, Power & Humphrey, 2013). Thus experience within the decision domain can assist intuitive knowledge, reduce uncertainty and increase action implementation; thus arguably a lack of experience may contribute to increased action failure.

3.6.4 Negative affect

When faced with a difficult choice, individuals experience negative emotions (e.g. anxiety at having to make a choice) and also anticipate the potential for negative affect in the future (e.g. anticipated regret following a choice). The ‘rational-emotional’ decision making model (Anderson, 2003) suggests that individuals consider both rational costs and benefits (e.g. objective monetary gain), and more subjective and emotional factors. In other words, individuals will rationally avoid choice if they anticipate potential negative affect. Indeed, emotions that are associated with the failure to take action (via avoidance, inertia or implementation failure) include: disappointment (Zeelenberg et al., 2000); uncertainty (Bond & Nolan, 2011; Kopylov, 2009; Ritov & Baron, 1995; van den Heuvel, et al., 2012; van Dijk & Zeelenberg, 2005; White & Hoffrage, 2009; Yen & Chuang, 2008); doubt (van den Ven, Gilovich & Zeelenberg, 2010); fear (Coleman, 2010; Eyre et al., 2008); and regret (Arkes, Kung & Hutzel, 2002; Kumar, 2004; Tykocinski, &

Pittman, 1998). Individuals tend to overestimate the intensity of future emotions (Wilson & Gilbert, 2003) and so the *thought* of loss is stronger than the *experience* of loss. This suggests that the anticipation of negative feelings is more likely to induce avoidant processing than the experience of negative emotions. Fundamentally, when people experience or anticipate negative emotions, then they will adapt their cognitive processing to try and reduce or avoid negative emotions. The experience of negative affect may thus distract decision makers from the cognitive processing of choice, increasing the likelihood of action failure.

3.6.5 Personality

Personality research has identified how certain individuals may possess certain traits that can influence the way that they make decisions (Brooks, 2011). For example, when asked to choose between options in a given decision task, trait ‘indecisive’ individuals tend to use maladaptive cognitive processing styles that systematically compare all alternatives whilst utilising extremely high thresholds of acceptance (Patalano & Wengrovitz, 2007). They fail to take action as they use alternative-based search patterns to try and find the *perfect* option (i.e. are any of these options good enough?). Alternatively ‘decisive’ individuals tend to favour more adaptive attribute-based search patterns in order to select a compromise option from those that are available (i.e. which option is the best?). Trait indecisiveness not only influences individual choice, but has been associated with implementation failure in organisational team settings (Brooks, 2011). Likewise, high scores on personality measures such as ‘state-orientation’ (i.e. focus on negative emotions; ruminate on past) as opposed to ‘action-orientation’ (i.e. focus on present task) are associated with increased inertia and redundant deliberation (van Putten, Zeelenberg & van Dijk, 2009), and those high on ‘need to compare’ (i.e. need to engage in social comparisons with others) often fail to make decisions as they experience increased regret due to constant social comparison (Gibbons & Buunk, 1999; van Dijk & Zeelenberg, 2005).

Other traits associated with failures to act include: ‘desire for control’ (i.e. need to maintain control over decision outcomes: Thomas, Buboltz, Teague & Seeman, 2011); ‘outcome sensitivity’ (i.e. motivated to avoid post-decisional feedback: Dholakia, Gopinath & Bagozzi, 2005); ‘neuroticism’ (Wong, Yik & Kwong, 2006);

and trait ‘avoidance’ (versus approach) motivations (Corr, et al., 2013; Harmon-Jones et al., 2011). Generally, the types of personalities that are affiliated to inaction reflect poor cognitive flexibility, as they are unable to adapt to the time demands of the problem environment (Roskes et al., 2013). Fundamentally, personality traits that are associated with inaction tend to be linked to salient negative affect and anxiety, which increases cognitive load and reduces the ability for the decision maker to focus on task-relevant goals.

3.6.6 Avoidant goals and motivation

A final factor that may increase the likelihood of action failure is associated to the type of goal that the decision maker is using to guide their choice. Goals influences the way that an individual will cognitively process their choice environment, and so will influence the likelihood of whether they will take action or not. It is suggested that when decision makers seek to *avoid* potential negative outcomes, then they are less likely to take action. One type of goal that may derail choice implementation is the goal to ‘maximise’ one’s outcomes. When individuals seek to ‘maximise’ outcomes, they tend to use ‘alternative-based’ cognitive processing to judge *if* any options are good enough (Parker & Schrift, 2011). Although maximising strategies may be appropriate for when decisions are non-time bounded and/or have the potential to be deferred; the effectiveness of maximising goals reduces when decisions are needed quickly. Selective goals will increase a decision maker’s tendency to focus on subjectively meaningful attributes and raises their overall threshold of acceptance (Parker & Schrift, 2011); thus maximising goals may increase the likelihood of choice deferral and inaction.

When individuals seek to maximise outcomes then they are more likely to avoid or postpone their choice as they await better options. Individuals who score highly on measures of trait ‘indecisiveness’ chronically seek to maximise their outcomes and favour alternative-based processing styles (Patalano & Wengrovitz, 2007; van Dijk & Zeelenberg, 2005). Indeed, when individuals deliberate on a choice, they are less satisfied if they do make a choice and tend to doubt their options more, which could exacerbate decision delays (Ritov, 2006; van den Ven, et al., 2010). Alternatively, when individuals use minimum thresholds or satisficing strategies (i.e. select first option which meets threshold) then they are more likely to take action as

they select the first available option to meet their minimal requirements (Dhar, 1997; White & Hoffrage, 2009). They tend to adopt an ‘attribute-based’ processing styles (Patalano & Wengrovitz, 2007), which involves consideration of *which* option is the best and is appropriate for when decisions need to be made quickly and cannot be deferred. Thus the use of alternative-based search strategies may be characteristic of decision inertia as the decision maker tries to maximise their choice; yet this paradoxically inhibits action as no further useful information is available. Instead of ignoring the decision, they ignore the fact that no more information is available to help them make that choice.

In addition to the negative effect of ‘maximising’ goals, it is also suggested that ‘avoidance’ goals will impede action (Elliot, 2006). Generally, when individuals are motivated to *avoid* loss, then they are less likely to take action due to the fear of potential negative consequences (Corr & McNaughton, 2012). Individuals seek to avoid negative outcomes and so will avoid choices that can cause negative affect. Alternatively, *approach* goals (i.e. when one seeks to achieve positive outcomes) have been associated to increased action (Elliot, 2006). However, it is possible that approach goals (i.e. when one is oriented towards achieving positive outcomes) may negatively interact with decision making if individuals are faced with mutual attractive options. When individuals have to trade-off mutually attractive and competing goals, they will try and avoid making a choice (Karlsson, Juliusson, Grankvist & Garling, 2002). Rather than avoid choice because of anticipated negative outcomes, choice is avoided as the decision maker is unable to differentiate between options and justify their choice (Dhar, 1997; Novemsky, et al., 2007). This could be linked to ‘maximising’ goals, which also derail behaviour due to the inability to effectively compare options (Parker & Schrieff, 2011). Fundamentally, it appears that different types of goals influence the use of different cognitive processing styles; both avoidant and maximising goals seem to limit the ability to make a decision.

3.7 Discussion

This chapter has presented a taxonomic classification of failures to act (Figure 3.1). It defines three types of action failures (decision avoidance; decision inertia; implementation failure) and proposes a number of (theoretical) antecedents that may

contribute to the likelihood of action failure. Decision avoidance is the intention to defer and avoid thinking about a choice for the time being. Decision inertia is the continual, yet fundamentally redundant, cognitive deliberation on a choice for no cognitive gain. Implementation failure is failure to translate cognitive commitment to choice into behavioural action. All three produce the same categorical outcome: a failure to act / non-decision. However, the subjective experience and motivation of the decision maker are psychologically distinct. Importantly, this chapter avoided outlining any hypothetical causal relationships between antecedents and inaction types as significantly more research is required in order to build further insight on this concept. The predominant focus of decision making research to date has focused on researching the frequency, quality and rationale governing actions. The research on failures to act is still in its infancy. This chapter is an important step in enhancing the concept validity of the research that will be outlined in this thesis.

3.7.1 Implications: Measuring the absence of behaviour

The central aim of this chapter was to convey the importance of researching failures to act as '*more is missed by not doing than not knowing*' (p.28, Byrnes, 2011). Despite a multitude of real-world, high-stakes emergencies evidencing how inertia, delays and failures to act severely limited the responses to major disasters, such as the Boxing Day Tsunami in 2004 (National Audit Office, 2005) and the Haiti earthquake in 2010 (Patrick, 2011), the psychological interest in this phenomenon is limited. It is important to address this gap, by exploring the methodological implications for researching the absence of behaviour (specifically, the concept of 'non decisions'). The reader is referred to Chapter 2 for a full discussion on the different methodologies used to research action failure in this thesis, but this chapter will provide a brief overview.

One fruitful method that has been used to explore novel decision making concepts in the past is the *qualitative* assessment of decision making. Indeed, Cognitive Task Analysis (CTA) and semi-structured interview protocols such as the Critical Decision Method (CDM), which aim to identify the knowledge requirements, expertise and goal structures involved in a decision maker's work (Wong, 2003), can help to unpack the psychological experience of the decision maker (Crandall, Klein & Hoffman, 2006; Hoffman, Crandall & Klein, 2008).

Although CTAs have predominantly been used to explore the cognitive processing associated with *performing* domain-specific tasks, this chapter argues that they can also be used to explore the reasons why individuals may *not* take action. The use of ‘what if’ probes, which encourage the interviewee to consider hypothetical choice, are already employed in CTA interview (Crandall et al., 2008). They could be used to help understand why individuals may or may not have acted when faced with a tough decision by considering alternatives (e.g. ‘what do you think would have happened if you had taken action?’). Furthermore, as CTA interviews are oriented towards interviewing *experts* in a given field, and as experts are self-aware with regards to when they do *not* know what to do (Kahneman & Klein, 2009), then interviewing a large cohort of experts about ‘challenging’ decisions could help generate an understanding of the common antecedents that induced action failures. CDM interviews were thus used to help unpack the specific concept of decision inertia in this thesis, with results discussed fully in Chapters 4 and 5.

From an empirical perspective, it may also be possible to measure the absence of behaviour through controlled experiments. It would be possible to manipulate the decision environment to see if inaction could be caused by, for example, increasing social ambiguity. The time taken to make decisions may provide a useful dependent variable to measure decision inertia, by comparing how fast an individual or team responded to a decision problem. It may also be useful to design experiments to more fully extrapolate the differences between causes of decision inertia, decision avoidance and implementation failures. It is possible that, as previous research has treated ‘decision avoidance’ as a unitary concept, then some studies that report findings on ‘decision avoidance’ are actually measuring decision avoidance. The distinction in this taxonomy could be used to replicate and reassess past findings to strengthen the construct validity of research on failures to act. This thesis aimed to explore failures to act more closely by investigating the challenges to decision making in multi-agency, emergency command team settings. Chapters 6 and 7 outline more empirical data collection on action failures during an immersive simulated exercise.

3.8 Conclusion

The psychological process associated with not making a decision is as conceptually important as the psychological processes associated with making a decision. Yet the research exploring failures to act is sparse. This chapter used the CIS method to analyse the available literature on this concept and identified three conceptually distinct types of failures to act: decision avoidance; decision inertia; and implementation failure. Distinguishing between different types of failures to act is not only important for the construct validity of the psychology of absent behaviour, but has practical implications in offering recommendations for how one may improve the likelihood of action. There are both conceptual and methodological challenges for researching the absence of behaviour; yet the benefits for tackling these challenges to facilitate psychological discovery far outweigh them. Over the years, psychologists have developed expertise in helping us to understand the linkage between the environment, behaviour and human cognition by experimenting on and observing the relationship between stimulus and response. But there has been far less attention paid to understanding and explaining the relationship between stimulus and *non-response*. This chapter has taken the first steps in identifying and highlighting this gap and offered brief methodological advice on how one may investigate inaction. Fundamentally, it has aimed to engender psychological enquiry so that we can more fully understand not only why people make decisions, but importantly why, at times, actions can fail.

Chapter 4: ‘Save life’ versus ‘Prevent further harm’: How decision inertia results from conflict between approach-avoidance goals and anticipated negative consequences

4.1 Abstract

An initial step in data collection for this thesis was to explore the challenges to ‘blue light’ (i.e. Police Service, Fire and Rescue Service, Ambulance Service) command level decision making. This was to develop an understanding of the factors that may contribute to decision inertia. The Critical Decision Method (CDM) interview technique was used to identify the knowledge requirements, expertise and goal structures involved in emergency response commanding by asking commanders to recall a ‘challenging’ incident they had responded to in the past (Wong, 2003; see Chapter 2). Specifically, this chapter explored how different types of goals interacted with the ability to make decisions. It emerged, through Grounded Theory (GT) coding, that commanders struggled to make decisions when they had to trade-off competing goals. This tended to be due to conflict between *approach* goals to ‘save life’, which motivated commanders to take action in order to achieve *positive* outcomes, against *avoidant* goals to ‘prevent further harm’, which motivated commanders to avoid potential short- and long-term *negative* consequences. Interestingly, anticipated negative consequences were linked to anxiety for both causing harm by *commission* (action) and causing harm by *omission* (inaction). This led to goal conflict between the anticipated negative consequences for action and inaction; inducing decision inertia. Goal conflict arose at both the individual (psychological) level and the team (social) level. It is recommended that training to extrapolate the distinction between approach and avoidance goals may reduce these negative effects.

4.2 Introduction

Decision making in the emergency services is heavily influenced by goals. For example, the Joint Emergency Services Interoperability Programme’ (JESIP) Joint Doctrine outlines the primary goals of the emergency services to collectively ‘save life’ and ‘reduce harm’ (JESIP Joint Doctrine, 2013). According to ‘goal-setting theory’ (Locke & Latham, 1990, 2002), the setting of specific, hard goals leads to increased task performance than more abstract goals such as to ‘do one’s best’. Goals

help to *motivate* behaviour by creating an emotional desire to successfully achieve one's goal (Locke & Latham, 2006). Goals are linked to motivation, as when individuals expect to receive feedback on their goal-relevant performance they will try harder to achieve their goals (Rainey, 2003). Yet, despite the advantages of goal-setting in organisational contexts, its usefulness in the domain of extreme decision making has been less explored. Research has suggested that when police officers expect to receive feedback on their decisions in high-risk settings, this can *derail* performance as they focus on self-preservation (Waring, Alison, Cunningham & Whitfield, 2012). Furthermore, when operating in multi-team environments, egocentric individual goal-setting can degrade interdependent performance (Kleingeld, Mierlo & Arends, 2011). This suggests that the impact of goal-setting in extreme environments, characterised by extreme psychological and interpersonal pressures (Orasanu & Liberman, 2011), requires further investigation.

This chapter will explore how goal-setting interacts with the decision making in extreme emergency response environments. Specifically, it will identify whether different types of goals may increase or decrease the likelihood of decision inertia and redundant deliberation. Rather than focus on *specific* goals of the emergency services (such as 'save life' or 'rescue casualty'), it will attempt to code goals at the psychological level so that findings have application to other extreme environments. Furthermore, as this chapter is interested in understanding how different goals may increase or decrease the likelihood of behaviour, the literature reviewed in this introduction will focus on the difference between 'approach' goals (to take action) and 'avoidance' goals (to avoid action). Thus, the aims of this chapter are as follows:

- (i) Outline the importance of goal-setting in emergency environments
- (ii) Introduce the concept of approach and avoidance goals and distinguish between two models:
 - a. Behavioural model – which identifies the conditions under which one may physically (or psychologically) approach or avoid a stimulus
 - b. Functional model – which identifies the conditions under which one may strategically approach or avoid a stimulus
- (iii) Focus the literature on *avoidant* goals due to their hypothesised relationship with decision inertia

- (iv) Present qualitative findings on the perceived interaction between goals and decision making in emergency response contexts
- (v) Discuss results with reference to the literature and provide recommendations

4.2.1 Goal-setting in emergency environments

Goals are important for guiding decision making in extreme environments. They help to orient behaviour around a desired outcome and to motivate the responder to put effort into achieving that outcome (Locke & Latham, 2006). The *motivation* to achieve a certain goals is crucial, and is thought to represent the link between emotions and goals (Elliot, 2006). Specifically, motivation serves to: (i) energise or direct behaviour; (ii) causes psychological or physiological movement or change; (iii) creates movement towards or away from a positive or negative stimulus; (iv) links positive and negative emotions; and (v) involves concrete and psychological stimuli (Elliot, 2006). For example, a commander responding to a large scale road traffic collision (concrete stimulus) may be energised to make a decision (psychological movement) in order to reach a positive goal (free casualty), which induces positive emotions (relief). Goals can be concrete (e.g. free casualty) or abstract (e.g. successful response) and related to the present (e.g. incident related consequences) or anticipated to arise in the future (e.g. post-incident consequences) (Eder & Hommel, 2013). Motivation translates goals into action by inspiring the individual to invest their efforts towards goal achievement. It is important that goal-setting in emergency response settings serves to motivate individuals to achieve a successful resolution and inspires them to take action. As this chapter sought to understand why actions sometimes *fail* (and thus ‘save life’ goals are not met), it was important to qualitatively identify the different types of goals that commanders may be using, which may negatively interact with action.

4.2.2 Distinguishing between approach and avoidance goals

The data presented in this chapter was generated from qualitative interviews with commanders from the emergency services. Specifically, it was interested in exploring how different goals may facilitate or inhibit action, it is important to explore the psychological literature on ‘approach and avoidance’ goals. Approach and avoidance goals influence the tendencies of an individual to either strive to take

positive action and move towards a positive stimulus (approach) or try to avoid negative effects by moving away from a negative stimulus (avoidance) (Bossuyt, Moors & De Houwer, 2014; Elliot, 2006; Elliot, Eder & Harmon-Jones, 2013; Gray & McNaughton, 2000). Generally, when an individual experiences positive emotions they are motivated to *approach* action; whereas negative emotions are linked to *avoidance* (Elliot, 2006). From the perspective of goal-setting theory, this suggests that performance goals may be categorised into two types: those focussed on approach to take positive action (e.g. 'save life') and those focussed on avoidance to avoid further harm (e.g. 'reduce harm'). It is important to explore how these two different types of goals interact with behaviour in emergency response settings.

Prior to discussing approach-avoidance goals in more detail, it is important to outline an important, yet somewhat confusing, issue in the literature on motivation. Some researchers describe avoidant behaviour with reference to *functional* goals (Bossuyt et al., 2014; Corr et al., 2013), whereas others define avoidance as the physical (or psychological) *movement* away from an aversive stimulus (Berkowitz & Harmon-Jones, 2004; Harmon-Jones, Harmon-Jones & Price, 2013). In other words, shouting at someone to make them go away may be considered as *avoidant* behaviour by those using functional models; however those who take a more *behavioural* perspective may perceive shouting as *approach* behaviour as it involves movement towards the stimulus. To explain these different perspectives, it is possible that these variances are due to the different types of decision making they discuss, with the functional approach addressing whole problem solving, which may involve multiple choices and so is guided by more strategic thinking (e.g. how to respond to an emergency incident), and the behavioural approach addressing reactions to specific stimuli / decision events (e.g. whether to enter a burning building or not). As this chapter sought to extend the understanding on the challenges associated with *commanding* the response to dynamic emergency incidents, its theoretical scope aligns with the *functional* perspective.

4.2.2.1 Behavioural perspective on approach and avoidance

The behavioural perspective on approach and avoidance explores the conditions under which an individual may physically, or psychologically, approach or avoid a given stimulus. It is suggested that the experience of positive emotions activates

approach behaviour; whereas negative emotions activate *avoidant* behaviour (Carver & White, 1994). People are motivated to engage with positive stimuli and avoid negative stimuli. Unlike the functional perspective, which distinguishes between the setting of approach or avoidance *goals* (e.g. to ‘save life’ or to ‘avoid harm’), the behavioural perspective distinguishes between approach or avoidance *behaviour*. Indeed, neurobiological research has helped to identify different areas of the brain that may be activated when one is motivated to use approach or avoidance behaviour (Gray, 1990). It is suggested that motivation is housed in the septo-hippocampul region of the brain (Gray, 1990). Namely, the *Behavioural Approach System* (BAS) motivates the individual to move *towards* the stimulus and the *Behavioural Inhibition System* (BIS) motivates the individual to move *away* from the stimulus (Gray & McNaughton, 2002). It has been found that the tendency to show approach or avoidance behaviours may be linked to individual differences in chronic activation of these areas (Carver & White, 2004). Furthermore, at the subconscious level, certain stimuli in the environment may activate these brain areas leading to associated behaviours (Gray & McNaughton, 2002). As this chapter is interested in the relationship between approach and avoidance *goals* as opposed to neurobiology, there will be no further discussion of this concept. However it is useful to highlight this distinction between approach-avoidance *behaviour* and approach-avoidance *goals*.

4.2.2.2 Functional perspective on approach and avoidance goals

The approach / avoidance distinction has also been applied to *goal* setting. Research on student performance has found that setting goals to succeed in an exam (approach goal) can have a greater positive impact on performance than the goals to avoid failure (avoidance goal) (Darnon, Butera, Mugny & Hulleman, 2009). Approach goals facilitate performance; whereas avoidance goals disrupt it. This thesis sought to explore the challenges to decision making that may be associated with *failures* to act; specifically with reference to redundant deliberation and decision inertia. Thus, it was important to see whether holding *avoidant* goals (e.g. ‘stop further harm’) may impede performance. Would setting (or holding) avoidant goals impede decision making? And how does this link to behaviour?

As mentioned previously, there is semantic confusion in the literature on approach and avoidance due to a poor distinction between *functional* goals (i.e. to remove/escape/get rid of the stimulus) and *behaviour* (i.e. to create psychological or physical distance). Although an individual may hold functional *approach* goals to, for example, ‘save life’, this does not necessarily mean that active behaviour is required to achieve this goal. Likewise, functionally avoidant goals do not necessarily lead to avoidant *behaviour*; sometimes approach behaviours can achieve avoidance end-goals (Bossuyt et al., 2014). For example, when someone is faced with a threatening situation that they seek to *avoid*, this may be achieved by displaying aggressive *active* behaviour such as shouting at someone to get rid of them (Berkowitz & Harmon-Jones, 2004; Carver, 2004). The characteristics of the problem environment influence which type of behaviour is most appropriate. Similarly, it has been found that when individuals experience a (negative) temporary loss of control in a situation, then this can increase *approach* behaviours as individuals seek to (functionally) avoid negative outcomes by regaining control and taking positive action (Greenaway, Storrs, Philipp, Louis, Hornsey & Vohs, 2015; Sedek, Kofta & Tyszka, 1993). This suggests that individuals took *active* behaviour (i.e. to regain control) in order to achieve *avoidant* goals (i.e. to avoid losing control). In the context of emergency responding, this may imply that initial chaos in an incident would galvanise commanders to take action in order to avoid negative consequences via action. However, it was also found that when situations were overly complex and characterised by prolonged loss of control, then individuals shift to *avoidant* behaviours due to learned helplessness and a fear of further loss (Sedek et al., 1993). Thus, prolonged loss of control could derail choice as commanders feel helpless and so try to avoid *further* negative consequences via inaction. It is important to investigate this relationship more closely, to see how goals interact with behaviour in complex emergency incidents.

4.2.3 Avoidant processing in extreme environments

As this thesis aimed to explore the concept of decision inertia; it was predicted that *avoidant* goals may contribute to the failures to act. This is because, rather than focus on taking positive action to resolve the emergency incident, it was hypothesised that avoidant goals would distract emergency responders by overly focussing on anticipated negative outcomes. In extending the research on approach

and avoidance goals, Corr, DeYoung and McNaughton (2013) distinguish between two types of avoidance: *active avoidance* and *passive avoidance*. In line with previous models, they acknowledged that functionally avoidant goals can lead to both approach and avoidant behaviour, and defined this concept as ‘active avoidance’. In addition, they described how ‘passive avoidance’ can arise during decision making due to behavioural inhibition as a result of goal conflict (Corr et al., 2013). When people ‘actively’ avoid choice, they seek a way to avoid the stimulus either by moving towards or away from it. Passive avoidance on the other hand describes avoidance, without intent, due to behavioural inhibition as a result of goal conflict. It is suggested that ‘passive avoidance’ offers a fruitful explanation of *decision inertia*, as individuals *passively avoid* taking action due to internal goal conflict. Likewise, *active* avoidance of choice can explain *pure* decision avoidance, as individuals seek to escape the decision context. It is anticipated that, as emergency settings are characterised by competing and complex goals (Orasanu & Connolly, 1993), then passive avoidance (i.e. decision inertia) would be highly prevalent.

It has been suggested that the inability to trade-off competing goals may be as a result of loss aversion: a cognitive bias that describes the innate desire to avoid losses due to the negative (and disproportionate) emotional impact of losing (Kahneman, 2003). Passive avoidance may arise as a result of loss aversion, as individuals seek to avoid taking action that induces loss (Corr et al., 2013). Commanders might ‘passively avoid’ action because they struggle to trade off conflicting goals, priorities and options. This could further be exacerbated by the multi-agency context, which is often characterised by conflicting inter-team goals (Mathieu, Heffner, Goodwin, Salas & Cannon-Bowers, 2000; Millward, Banks & Riga, 2010). Similarly, passive avoidance may be a result of ‘omission bias’, whereby individuals irrationally perceive the potential for greater harm as a result of taking action (commission) than not taking action (omission) (Inman & Zeelenberg, 2002). Commanders passively avoid choice as they try to trade off anticipated negative consequences associated with both action and inaction. Indeed, omission bias is especially salient when making morally challenging decisions (such as the life or death situations in an emergency context) as individuals tend to favour deontological protected values that require no action (‘I will do no harm to anyone’) to, more rational, consequentialist values that require action (‘I will harm one to save

many') for fear of blame (Bartels & Medin, 2007; Ritov & Baron, 1995). Thus, a challenge to emergency responding may be the trade-off between mutually competing anticipated negative consequences as a product of both taking action (e.g. make situation worse) and not taking action (e.g. allow further harm to happen). It is expected that passive avoidance as a result of various cognitive conflicts will be a key cause of decision inertia and an important concept to explore.

4.2.4 Summary and chapter aims

This chapter was interested in the interaction between different types of goals and their impact on the ability for emergency response commanders to make decisions in complex environments. It identified the importance of goal-setting to help guide decision making, but identified how goal-setting in extreme environments is less well understood due to the complexities of the environment. It introduced the approach-avoidance distinction on goals and identified the difference between functional goals and associated behaviour. It then focussed discussions on avoidance motivation and identified the concept of 'passive avoidance'; which creates behavioural inhibition as a result of goal conflict. This chapter took an exploratory approach in order to inductively identify the different types of goals used by emergency responders during decision making, and to identify how they may facilitate or inhibit behaviour. It is anticipated that 'passive avoidance' is associated with decision inertia; as commanders struggle to take action due to goal-conflict between competing avoidant goals.

4.3 Method

4.3.1 Data Collection

Data was collected from n=31 command level decision makers from the three blue lights services: the Police Service (PS), the Fire and Rescue Service (FRS), and the Ambulance Service (AS), who were interviewed using the Critical Decision Method (CDM). As discussed in detail in Chapter 2, CDM is a form of Cognitive Task Analysis (CTA), which is useful for identifying the goal structures, knowledge requirements and the expertise that is required in order to successfully respond to a challenging incident in the decision maker's work (Wong, 2003), and has been well utilised in NDM research that is interested in generating real-world findings

(Crandall, Klein & Hoffman, 2006; Klein & Militello, 2004). Participants were identified as 'command level' as they were all qualified to fulfil a command role for their respective agencies in a real-life incident, meaning that they were ultimately responsible for decisions affiliated to both their own (intra) agency and when making joint decisions by coordinating with other (inter) agencies. For example, whether to request additional resources from other regions (intra-agency decision) or whether to commit emergency responders into a collapsed building (inter-agency). As command structures within each agency differ (e.g. different ranks and roles), participants were selected if they could fulfil the role of 'tactical' commander. This was because they were anticipated to have enough experience to recall a challenging incident in detail and so met the requirements of the CDM interview. Participants were recruited via opportunity sampling via email, which was sent to potential participants by work email. Emails included an information sheet explaining the details of the interview (Appendix Three) and participants were instructed to contact the researcher via email or telephone if they wished to take part.

4.3.2 Procedure

The majority of interviews (n=29) were conducted at the interviewee's place of work with the remaining two taking place at the University of Liverpool. All interviews were conducted in a quiet location, with three people present: the interviewee and two researchers. The role of the primary researcher (the author to this thesis) was to lead the interview and ask the interviewee questions in line with the semi-structured interview protocol (Appendix One). The interview protocol, described in detail in Chapter 2, followed four CDM 'sweeps': (i) incident identification; (ii) timeline verification; (iii) deepening probes; and (iv) 'what if?' probes. Participants were asked to identify a '*difficult decision*' that they had made in the past; and provided with a series of prompts to help identify an incident that both they and the interviewers felt was relevant to the purpose of the study. The incident had to be '*especially challenging*' with '*high consequences*' that would be '*very difficult to reverse*'. Although not all of the incidents were *major* incidents, they were all perceived to be highly challenging by the interviewee and associated with many of the eight characteristic features that Orasanu and Connelly (1993) identified as being characteristic of challenging decision making in the real-world. For example, a multi-car road traffic collision may not be classed as an official 'major

incident' but it does reflect an ill-structured problem; in an uncertain dynamic environment; with competing goals; feedback loops; time stress; high stakes; multiple players; and with inherent organisational goals and norms and associated demands.

During the course of the interview, the secondary interviewer made copious notes on an observer form (Appendix One), which listed all the questions being asked by the primary researcher with space for notes. They also provided useful verbal prompts if the primary interview missed any key questions and were encouraged to ask additional questions at the end of the interview based on the notes they had recorded. Specifically, the secondary interviewer highlighted any additional information that emerged during the 'timeline verification' sweep of the interview, and took preliminary steps in analysis by noting for recurring themes or patterns. Following each interview, the primary and secondary interviewers reflected on the interview in detail, which helped to facilitate subsequent coding for this chapter.

A potential weakness of the interview method is that the skills of the interviewer can develop over time and this may create variability in the responses provided by participants (Crandall, et al., 2006). Early interviews may be less effective due to a poor understanding of organisational-specific terminology or the interviewer's interest may change in response to themes that emerge from the data. Furthermore, the interviewer must develop skills in 'double attention' early on in the process, being able to listen to and probe upon the answers provided by subjects whilst attending to other topics they wish to cover within the given time limitations (Wengraf, 2001). However, an important part in the methodological procedure for this thesis involved the development of measures to mitigate these effects; for example the primary researcher had previously worked with each agency on various collaborations prior to these interviews and thus had an established working knowledge of associated terminology (Hoffman, 1987). Furthermore, a flexible interview protocol can strengthen qualitative research, as theories can be developed and tested 'in vivo' during data collection (Lo, 2014), whilst maintaining scientific validity through the structure of an interview protocol to ensure deviations are not too wide (Crandall et al., 2006). The process of 'self-monitoring' during the data collection phase by reflecting on interviews can further the interviewer's understanding of the true meaning of their research questions (Mueser & Nagel,

2009) and secondary interviewers can help verify and moderate deviations during this process.

4.3.3 Materials

The interview protocol consisted of an 8 page document that was used to both guide the interview and to make handwritten notes (Appendix One). Participants signed a consent form at the start of the interview to acknowledge their consent (Appendix Four). They also provided basic descriptive details on the front page of the interview protocol on sex, age, length in service and a brief description of main duties and responsibilities. Interviews were recorded on a Dictaphone and later anonymously transcribed by the primary researcher on Microsoft word with all specific details (e.g. names, locations) removed from the files prior to analysis.

4.3.4 Data Analysis

Transcripts were analysed using a ‘Grounded Theory’ (GT) approach (Glaser & Strauss, 1965). Chapter 2 describes this process in detail as a useful method for generating theory through the ‘bottom up’ inductive coding of qualitative data (Amsteus, 2014). GT was chosen over other qualitative analyses techniques, such as ‘interpretative phenomenological analysis’, which seeks an understanding of how *specific* individuals, in *specific* contexts make sense of *specific* phenomena (Cohen, Mannion & Morrison, 2007). The focus of these interviews was to look at more *general* processing that moved beyond the process of sensemaking (Smith & Osborn, 2004). The CTA methodology encourages researchers to maintain a curious and open-minded attitude during data analysis to facilitate the *discovery* of meaning by linking cues and patterns within the data set (Crandall et al., 2006). Thus, GT aligned with the overall aim of data analysis: to generate a general theory of decision inertia by exploring the challenges to decision making for emergency responders.

Preliminary analyses were conducted immediately following each interview, where the primary and secondary interviewers discussed and reviewed the notes that were taken during the interview. This was to develop an iterative understanding of the main ‘challenges’ that were identified by participants during the data collection process. Analyses continued during the transcription of the audio recorded interviews, as the primary interviewer kept annotated notes on key themes that arose

during this second round with the data. Once interviews were transcribed, then the researcher used a more structured GT process (see Chapter 2) that was performed using the computer program NVivo10: a computer program that facilitates the organisation of qualitative data. Each transcript was read in full and utterances of interest were line-by-line coded into 'nodes', which were then refined to reduce duplicates or semantically similar nodes. Each 'node' in NVivo represents a repository of semantically similar text that the researcher has highlighted to be electronically stored in a folder. A key advantage to using NVivo, in comparison to more traditional coding via hand, is that it allows the researcher to easily create, update and merge themes, facilitating greater interaction with the data (Bazeley & Jackson, 2013). The second sweep of coding focussed on the emergence of *new* codes along with highlighting any additional utterances from the text that may have been missed during the initial sweep. This process of refinement and further coding continued until 'theoretical saturation' was reached; a point during GT analysis where no more conceptual insight can be reached from the data (Bloor & Wood, 2006). The final step involved the organisation of remaining nodes under theoretical headings that were used to guide visual models of the data. For the purposes of this chapter, this refers to the interactive model displayed in Figure 4.1, which describes the interaction between approach goals, avoidance goals, behaviour and inaction.

4.4 Results

4.4.1 Participants

A total of $n=31$ command level, UK emergency response participants were interviewed. They were asked to recall a "*difficult decision*" that they had responded to in the past. Police Service (PS) interviewees ($n=12$) ranged in rank from Superintendent to Chief Superintendent; the Fire and Rescue Service (FRS) interviewees ($n=15$) ranged from Station Manager to Chief Fire Officer; and the Ambulance Service (AS) interviewees ($n=4$) included Directors and Heads of service within the Trust. The sample was mainly male ($n=30$), and ranged from 37 to 54 years old ($M=44$ years, 7 months). All interviewees were qualified to command at 'tactical' level (with many qualified at 'strategic' level too), and they each had a minimum of 15 years' experience with a mean length of service of 24 years and 3 months.

4.4.2 Interviews

Interviews lasted a mean length of 1 hour, 39 minutes and 18 seconds. The summed total length of interviews was 51 hours, 9 minutes and 36 seconds, which was transcribed into 494,655 typed words across 31 interviews. The types of ‘challenging incident’ identified by respondents could be themed under nine categories: public protests and rioting (n=5); large urban search and rescue disasters (e.g. building collapse; train derailments) (n=5); firearms and hostage negotiation incidents (n=4); gas/chemical leaks (n=4); large fires (n=3); multiple vehicle road traffic collisions (n=3); crowd management and crushing (n=3); terrorism (n=2); and flooding (n=2). Due to the sheer volume of data that was collected, the initial line by line coding produced over 800 nodes (albeit a large number of these were collapsed during initial refinement due to semantic duplication). These nodes were then analysed using GT in NVivo to identify the following emerging themes.

4.4.3 Results summary: The interaction between approach goals, avoidance goals, behaviour and inaction during emergency response commanding

It emerged that emergency commanders held two overarching goals: (i) ‘save life’, associated with *approaching* positive outcomes; and (ii) ‘prevent further harm’, associated with *avoiding* anticipated negative consequences. ‘Save life’ was linked to general *behavioural* approach goals (e.g. committing firefighters inside a building; instigating a treat and leave triage strategy for paramedic); whereas the goal to ‘prevent further harm’ was associated with three avoidant behavioural goals to: (i) prevent harm to *emergency responders*; (ii) prevent escalating risk to the *casualty*; and (iii) prevent further disruption to *normality*. It emerged that the goal to ‘prevent further harm’ could derail action when it was associated to anticipated negative consequences. Anticipated negative consequences were associated to both short-term negative consequences, which were based upon negative outcomes associated to the three behavioural goals outlined above (emergency responder harm, further casualty harm, further disruption to normality) and long-term negative consequences, which were based upon negative consequences for: (i) themselves; (ii) their team; or (iii) their organisation. Crucially, anticipated negative consequences were not only linked

to anxiety about causing potential harm by *commission* (action), but were also associated with a fear of causing harm by omission (not taking action).

Figure 4.1 describes the interaction between approach goals, avoidance goals, behaviour and inaction. Specifically, it describes three pathways that describe how approach or avoidance goals may relate to approach behaviour (i.e. green pathway), avoidant behaviour (i.e. blue pathway) or inaction (i.e. red pathway). In describing the model, it emerged that individuals firstly assessed their situation based on the features of the situation and individual differences. This then led to activation of *functional* goals that were based on their organisational responsibilities. A positive assessment of the situation was associated to ‘save life’ (approach) goals; a negative assessment of the situation was associated with ‘prevent further harm’ (avoidant) goals; and uncertainty about the situation led to goal conflict. Approach *functional* goals led to active approach *behavioural* goals and approach behaviour; avoidant *functional* goals led to active avoidant *behavioural* goals and associated approach or avoidant behaviour. Uncertainty however derailed choice. Indeed goal conflict arose when approach oriented individuals were uncertain about their available options to achieve approach goals; or when avoidant individuals were distracted by the anticipation of negative consequences. This led to *passive* avoidance and inaction. It is this final derailing pathway that reflects decision inertia. The data upon which this model was derived will now be explored in more detail.

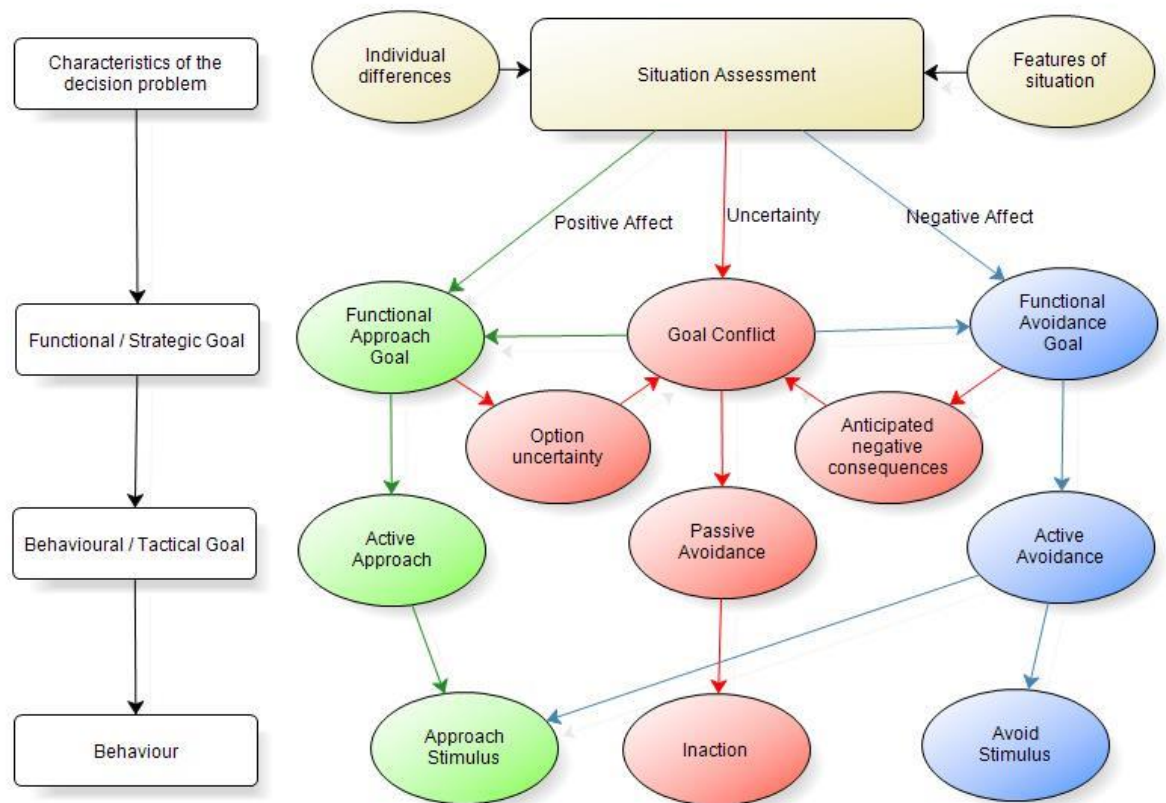


Figure 4.1: A model to depict the interaction between approach goals, avoidance goals, behaviour and inaction during emergency response commanding

4.4.4 Goal conflict: Approach ‘save life’ goals versus avoidant ‘prevent further harm’ goals

The desire to ‘save life’ is a well cited goal for emergency responding. It was often referred to by all three agencies during the course of the interviews (Table 4.1). The goal to ‘save life’ was coded as an approach goal as it was associated with the desire to take action: *“if I can do something to control and reduce the risk as much as I can to enable me to do that then I will do”* (F14). Specifically, the desire to ‘Save life’ appeared to be driven by feelings of time urgency and the desire to take fast action: *“I’ve got to make the decision now. I’m going to do something now”* (P9), in order to rapidly save or preserve the lives of the public: *“you get a mass number of casualties in a short space of time if you don’t get treatment to them”* (A1); *“yeah the paramedics were like well she’s time critical. We haven’t really got*

time to do the stabilisation or glass management you just have to get her out” (F14). Although all three agencies acknowledged ‘save life’ as a primary goal, they were often unclear about how to translate this functional goal into behavioural goals and action, referring to ‘save life’ in a redundant, rote repetitive, and at times even cynical, manner: *“it’s like your objectives of what you’re trying to do – save life and blah blah blah” (A4); “it was our responsibility as a search and rescue as a fire and rescue service to take what’s the expression? A calculated risk to save what we consider to be a saveable life” (F10).* This suggested that although ‘save life’ was an acknowledged strategic goal for all three services, the meaning of this *“standard tag line” (A4)* with regards to behaviour was less clear. This meant that action could derail as a result of behavioural option uncertainty (Figure 4.1).

The ‘save life’ goal also appeared to derail action if the decision maker experienced goal conflict by trading it off against the competing avoidant goal to ‘prevent further harm’. Both ‘save life’ and ‘prevent further harm’ goals were associated with responding to the emergency incident, yet whereas ‘save life’ was associated with approaching positive consequences through action, ‘prevent further harm’ was associated with avoiding negative consequences. Specifically, this related to three avoidant behavioural goals (tactical priorities) to: (i) avoid harming emergency responders; (ii) avoid causing further harm to casualties/victims; and (iii) avoid further disruption to normality (Table 4.1). The competition between approach-avoidance goals caused difficulties for decision makers due to anxiety about the potential negative consequences of action: *“what you have to avoid is delaying making your decision about anything which then leads to somebody getting hurt so but by the same token you don’t want to kneejerk and rush into a decision that is not properly considered” (P10).*

Table 4.1: Quotes reflecting the different types of approach and avoidance goals

Functional Goal	Behavioural Goal	Quote
Approach: Save Life	Endogenous to incident (e.g. extricate casualties; put out fire)	<i>"We can't just wait and say police haven't been in when you can see people across the road who were injured and wanted or needed help" (A1)</i> <i>"You must look at what we do and why we do it and that's to save life" (F9)</i> <i>"Put the door in basically and enter and save his life" (P9)</i>
Avoid: Prevent Further Harm	Avoid harm to emergency responders	<i>"But it had to be reasonable because you've got to bear in mind maximise safety of the officers as well as a strategy" (P8)</i> <i>"You do think more about the responders but at the same time you try and balance that with the job that you've got to try and do" (A2);</i>
	Avoid further harm to casualties / victims	<i>"I would prefer to be cautious and not risk any further injury by bringing him out in a way which I know to be a lot safer" (F2)</i>
	Avoid further disruption to normality	<i>"That's a main arterial route through the city so if you close that off too early you create quite a few problems for people who are just going about their business it was just a normal working day" (P10)</i>

4.4.5 Avoiding negative consequences: Trading off anxiety associated with anticipated long- and short-term negative consequences

Functional avoidance goals to 'prevent further harm' were associated with anticipating potential negative outcomes: *"I'll be quite frank there's no incident that you deal with that is easy. And the reason is because as part of your training you have to look at what the outcomes you want are – what are the desirable and what will you actually tolerate" (P12)*. It emerged that negative consequences were anticipated to arise both in the short- and long-term, and that they contributed to anxiety associated to violating the goal to 'prevent further harm' (Figure 4.2). Short-term (i.e. incident related) anticipated negative consequences were associated with the three behaviourally avoidant goals identified in Table 4.1. These included: (i) causing harm to emergency responders: *"That was what was the risk to us and taking into its worst case scenario you know we could come under fire, our team could come under fire" (A1)*; (ii) causing further harm or injury to casualties: *"at a minimum don't make it worse and as best case scenario you actually make it better"*

(F10); and (iii) creating further disruption to normality: *“I think the danger was if we started saying the national front were coming then the local community might start rallying themselves to escalate as well”* (P1); *“So the longer it went on the more sort of like impact that was being felt in normal service”* (A1).

In terms of potential negative long-term consequences, it was further found that sources could be split into three themes associated with: (i) personal consequences; (ii) team consequences; and (iii) organisational consequences (Figure 4.2). Anticipated future personal consequences included anxiety relating to personal pride: *“that does kind of go through your mind. Am I going to be professionally embarrassed by this?”* (P11); criticism from colleagues: *“You know you’ve got the gold commander looking down on you, you’ve got your bronze commander and your PSU commanders and all the staff looking up”* (P3); the potential for personal legal fallout: *“one decision by a police officer can have years of people unpicking it in the clinical warm surroundings of an officer where everyone can study well why did you do this? Well what about this, what about that?”* (P4), and personal accountability as a commander: *“I think that’s the biggest worry because you can oh well I’ve done this loads of times but then that one time something goes wrong”* (A3). Anticipated consequences associated with team outcomes were related to the legacy on inter-agency relationships: *“I think you’ve got to maintain relationships with people in the future and I just think that there’ll be other times when we will work together in a similar environment”* (P7); intra-agency relationship: *“it depends on being prepared to compromise your friendship to make sure the job gets done. So you know I think you’ve got to be to be honest if you’re going to be a commander you’ve got to be prepared to be unpopular – it goes with the territory really”* (P11); and the welfare of team members: *“It feels really mean as well going back to someone who’s had a really shit few hours dealing with something like that which is pretty traumatic and then saying you need to do this and you need to do that”* (A4). Finally, anticipated organisational consequences included anxiety about a potentially negative public perception of one’s organisation: *“we had to have a real sort of grown up conversation about not leaving the scene because how would that look? To the public”* (F1); the reputation of organisation: *“It was getting away from us and there was a reputational issue there around we effectively made world-wide news”* (F13); relationships with the local community: *“I’m in a no win situation because the local*

community are just constantly why are you letting this happen? Why are you letting this happen?” (P1); and financial consequences for the organisation: “I recall it being 6 o clock and in my mind the big issue then was overtime because I had all these assets in that were changing shifts at 6 o clock and there was a massive overtime bill to consider but you put that to the back of your mind because you can’t really change your tactical plan based on the fact that you’re paying overtime” (F3).

It emerged that the anticipation of consequences was associated to two contradictory sources of anxiety: (i) anxiety over causing harm through commission (i.e. taking action that causes harm): *“I think sometimes we delay, we delay decisions because we are always all the time clouded by some of the consequences which are not really about public safety as such but about other things you know about what happens if it goes wrong?” (P10); and anxiety associated to causing harm through omission (i.e. not taking action and causing harm): “You’ve got to go well we’ve got to get into this building because you know if we don’t do this then the consequences are greater” (F1). Importantly, although anxiety associated to harm by omission could be expected to induce approach goals, it was associated the avoidant goal to ‘prevent further harm’. As such, it resulted in active-avoidant behaviour driven by anxiety: “So I knew at that instance that I had one chance to get it set up exactly how I needed it or else the whole thing could you know collapse like a pack of cards really I guess is the best metaphor for it” (F10). Fundamentally, anticipated negative consequences appeared to derail decision making, as commanders were unable to judge the right time to take action: “you’re at the point of no return. You can’t then claw that back. You can’t raise it – you’ve reached the ultimate now so that’s it. You can’t go back on that” (P4).*

Interestingly, although respondents expressed negative affect and anxiety associated with harm by commission, respondents tended to reflect on their need to take action irrespective of anxiety due to their responsibility as a commander: *“had I not taken that action at that time then you’d have had thousands and thousands of litres of ammonia leaked out into the surrounding area and the impact would’ve been devastating” (F8). This was further associated to confidence in their professional integrity: “you must look at what we do and why we do it and that’s to save life so it’s putting a provision in” (F9). It is possible that holding clear understanding of one’s roles, responsibilities and professionalism facilitated action.*

Furthermore, this may be a result of the high level of expertise held in the sample; whereas novice commanders may struggle to cope with anxiety associated with avoidant functional goals leading to inertia or decision error. Commanders acknowledged this inability to cope with negative pressure as a potential reason for why novices may struggle: *“But you get to the point where you’ve got to make a decision now. So you go with what you’ve got” (F5); “I’ve never been to an incident where I felt I’ve had enough information to do anything. There is never a situation where there’s absolutely no risk every really so wouldn’t you just you’ve got to have you’ve got to trust your own judgement I think really and a lot of that is about experience and a degree of self-preservation I suppose as well that you’re not going to be reckless” (P11).*

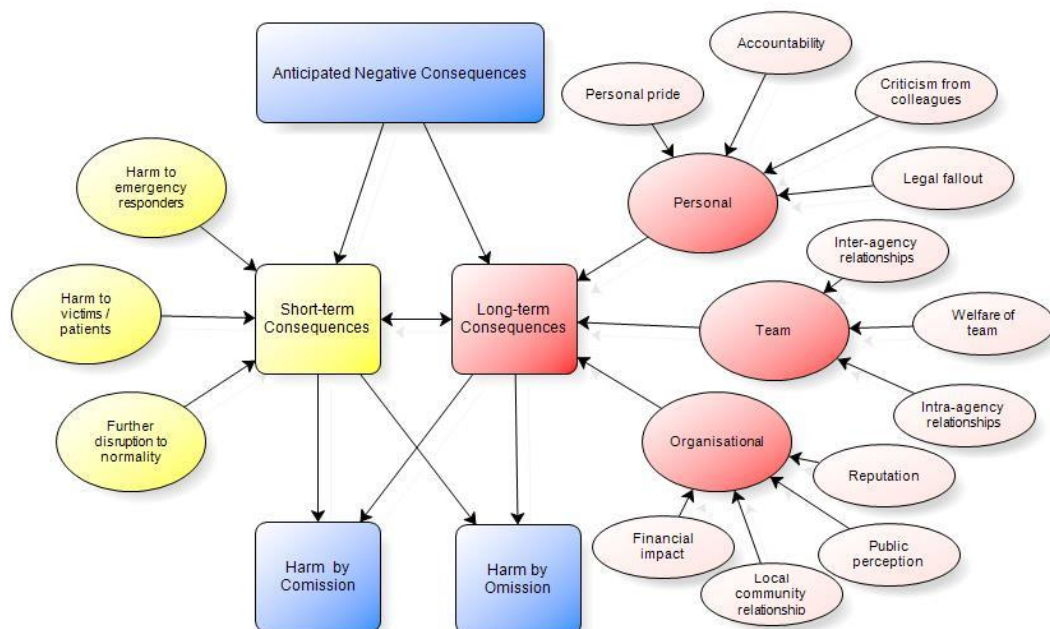


Figure 4.2: Anticipated short- and long-term negative consequences associated to emergency response

4.4.6 Agency-specific goal conflict and inter-agency disagreement

As the interview sample consisted of commanders from all three emergency services, it was also possible to explore for agency-specific differences in goal setting. It emerged that for PS commanders that conflict between approach ‘save life’ goals and avoidant ‘prevent further harm’ goals was especially challenging when they considered their agency-specific role to ‘prevent further disruption to

normality'. This appeared to be a result of their dual role to both respond to unanticipated emergencies whilst also being responsible for upholding and restoring a post-incident society of 'normality': *"The key for us the police have got to get control. We've got to get control and we've got to take the risk away from the public" (P9); "the cop's job is to create the environment that is safe for people to have a good time" (P2); "our role is safety, there's emergency and there's disorder" (P12); "So in the police you're sort of stuck in the middle of all of that a little bit really" (P10).* The awareness of this role conflict was associated with anxiety associated with taking premature action: *"If I go in too early this is what's going to happen? The balance of probability of what's going to happen is this is going to happen. So when it does escalate is it because of me or is it escalated despite my efforts? And I didn't want it to be because of me" (P4).*

Although other agencies acknowledged and empathised with the pressures on the PS to respond to emergency incidents whilst also being responsible for post-incident normality: *"The police have got that restore normality, keep law and order, keep a sense of wellbeing, they've got that public psyche in their mind as well" (F3),* it still led to multi-agency tension when the PS were perceived to prioritise 'normality' at the disproportionate cost of achieving 'save life' goals: *"the police really wanted to deal with this and their way of dealing with things is to swiftly deal with it, bring normality and move on" (F3).* The inter-agency conflict between 'save life' and 'normality' goals was most commonly discussed by members of the FRS: *"If we come in and put a cordon in place a 250 m cordon, I'm not really interested, I'm not bothered how much chaos it causes, I need the cordon because I'm saving the people I need to look after" (F3).* Once more, this appeared to be a product of the role of the FRS whose *"priority is rescue saveable life" (F10),* which conflicted with PS avoidant goals: *"The police were concerned around the timescales sort of thing: how long until we can get the motorway open?" (F4).* The competition between goals was associated with scepticism from the police that the fire service were disproportionately focussed on safety: *"Well I was slightly sceptical because traditionally there was almost an unwritten – there was lots of anecdotal evidence to say that the fire service seemed to be, from a police perspective, we felt as though they were overly cautious when it comes to those sort of jobs" (P5),* and further associated with defensive reactions by the fire service in response to police

perceptions: *"They will complain about us saying we only go everywhere in twos and we come mob handed to everything"* (F5); *"I remember him saying I don't want you turning up with the circus, that was the first thing"* (F3). Thus, conflicting goals were associated with multi-agency tension and disagreements, distracting commanders from responding at the incident ground.

Another example of inter-agency goal conflict was between the FRS and the AS concerning decisions on casualty extrication during road traffic collisions. It emerged that the AS tended to prioritise time critical 'save life' goals, desiring action as soon as possible: *"we can't just wait and say police haven't been in when you can see people across the road who were injured and wanted or needed help."* (A1); however, although both agencies sought to 'save life', the speed of action that was desired by the AS led to multi-agency goal conflict with the FRS, who sought to take slower action to 'prevent further harm goal' in order to 'enhance victim/patient safety': *"if there's any chance that they've got a spinal injury we will take the roof. We will do gold standard"* (F4). Conflict arose on whether to satisfice with fast action or to optimise to cautious safety, leading to disagreement between agencies: *"we have different priorities however we're both trying to do the same thing"* (F4); *"clearly everyone's primary concern and primary emphasis is patient care but there can be some difference of opinion over what the best thing for that particular patient is"* (F2). FRS commanders acknowledged that that time criticality can overtake safety in priorities in certain situations: *"had it been time critical what we always have is a plan A and a plan B – the plan A is as quick as possible. The plan B is the best and safest for all concerned at getting them out"* (F2), yet expressed frustration that other agencies were poorly informed of the practical constraints for conducting rapid extrication: *"I was liaising with him saying well I know where you're coming from with regards to casualty priority and obviously we're casualty focussed as well but obviously we'll get them out as quick as we can get them out. It's not like we're deliberately being slow it was just the nature"* (F14). Once more, inter-agency conflict was underpinned by suspicion about the true motivations of other agencies' demands: *"I suppose anecdotally we've got this evidence around paramedics are put under pressure by the hospital consultants not to bring people in on the spine boards because that saps A&E resources"* (F2). Fundamentally, it emerged that conflicts

between agencies appeared to be due to a poor understanding of one another's capabilities, responsibilities and priorities.

4.5 Discussion

Qualitative interview data was collected from n=31 experienced emergency service commanders to explore how goals interacted with decision making behaviour. It was used to generate an interactive model to explain the relationship between approach goals, avoidance goals, behaviour and inaction (Figure 4.1). Specifically, commanders appeared to hold both approach oriented goals associated with taking positive action to 'save life' and avoidance 'prevent further harm' goals to try and stop escalation and further detriment at the emergency incident. These functional approach / avoidance goals were associated with distinct behavioural goals: 'save life' related to behavioural goals to take action at the scene (e.g. instigate treat and leave casualty triage policy); 'prevent further harm' goals were associated with three distinct avoidant behaviours to prevent: (i) 'harm to emergency responders', (ii) 'further harm to victims', and (iii) 'further disruption to normality'. In unambiguous contexts, goals led to goal-relevant behaviour, whereby 'approach' led to 'action' and avoidance led to active-avoidance. However, if goal conflict arose as a result of ambiguity, then decision making was derailed inducing passive avoidance and inertia. Approach goals derailed if the commander was uncertain about their options; and avoidance goals were derailed when the commander was distracted by anticipated negative consequences. Fundamentally, anticipated negative consequences and ambiguity were associated with goal conflict, which induced passive avoidance and decision inertia. This model will now be discussed in further detail with reference to relevant literature by firstly describing the impact of decision inertia at the individual (psychological) level, followed by at the social (interpersonal) level (Orasanu & Liberman, 2011).

4.5.1 Decision inertia at the individual (psychological) level

The 'save life' strategic goal was a primary driver of command-level decision making. The goal to 'save life' is described in a number of government legislation and agency specific documents as '*common objectives for responders are saving and protecting human life*' (p. 19, Home Office, 2013). Goals are important for decision making as they help individuals to visualise abstract or concrete aspirations in order

to guide their behaviour (Eder & Hommel, 2013). The goal to ‘save life’ was associated with *approach* motivation as commanders were energised to take action in order to make a *positive* impact on the situation (Elliot et al., 2006; 2013). A second strategic goal was to ‘prevent further harm’, which was associated with *avoiding* negative consequences (both short- and long-term). Importantly, avoidance motivation was not always detrimental to decision making as sometimes preventative actions were appropriate. For example, protecting the scene for criminal investigative proceedings or protecting emergency responders from harm. Yet avoidant goals derailed choice when commanders were inappropriately distracted by the anticipation of potential negative consequences, leading to goal conflict, passive avoidance and inaction (i.e. decision inertia). Indeed, the anticipation of potential negative consequences is associated to feelings of regret, which decreased the likelihood of action (Mourali, Pons & Hassay, 2011). It is thus possible that an overt focus on anticipated negative consequences may have a key impact on decision inertia.

It also emerged that commanders’ decision making was derailed when they were uncertain about their situation assessment; which led to goal conflict between approach and avoidance. Indeed a lack of strategic direction in emergency incidents can degrade decision making, as individuals focus on redundant intra-agency information seeking over adaptive and collaborative action (Alison, Power, van den Heuvel, Humann, Palasinski & Crego, 2015). Furthermore, abstract or unclear goals can limit performance (Locke & Latham, 1990; 2002; 2006). This means that if one is uncertain about their goals, then this may derail action. Interestingly, *both* ‘save life’ and ‘prevent harm’ goals are outlined in the JESIP guidance for emergency responding: ‘*the overarching or primary aim of any response to an emergency [is] to save lives and reduce harm*’ (p.3, JESIP Joint Doctrine, 2013). This guidance is thus somewhat contradictory by blurring two different types of goal. For example, action to ‘reduce harm’ through, for example, protecting wider public from harm, may inadvertently violate ‘save life’ goals by limiting the ability to act at the scene. This would suggest that the strategic goals provided by JESIP are abstract and vague which may limit performance (Locke & Latham, 1990). A preliminary recommendation from the current research is to separate these two strategic goals

within the guidance literature to more clearly delineate the cognitive processing of emergency response commanders.

The anticipation of potential negative consequences was a key barrier to choice implementation. Commanders anticipated negative outcomes not only as a result of action (e.g. causing injury to emergency responders) but also as a result of inaction (e.g. incident escalating out of control). Research on moral choice has found that individuals irrationally perceive harm by commission (action) as more aversive than causing harm by omission (not taking action) as they feel more personally responsible for negative consequences as a result of their actions rather than inactions (Inman & Zeelenberg, 2002). The finding that commanders not only anticipated negative consequences from *action* but *also* due to inaction was unexpected. Why would commanders feel concerned about harm arising that they did not cause? This finding was further unusual when considering the context of emergency incident domain, as ‘omission bias’ (bias to *not* take action) tends to increase in high-risk situations (Bartels & Medin, 2007; Ritov & Baron, 1995). It could be assumed that ‘omission bias’ would be prevalent during emergency incidents as they are inherently high-risk situations (Alison & Crego, 2007). Yet counterintuitively, it emerged that commanders expressed salient anxiety about the potential negative consequences of *not* taking action. This was associated to decision inertia as commanders traded off anxieties associated to causing harm by both action and inaction. This unique effect may be due to the role-relevant responsibilities of a commander to manage the emergency incident, which induced an inherent desire to be proactive. Indeed, omission bias is a product of anxiety due to personal responsibility and potential for blame for poor outcomes (Kordes-de Vaal, 1996); thus in organisational settings whereby an individual is *responsible* for taking action, anxiety may be associated to inaction as well.

Although anxiety affiliated to harm arising via inaction was prevalent in the sample, commanders appeared to be aware of this guilt. At times it seemed to galvanise decision making as commanders felt inspired to take action. Indeed, anxiety affiliated to a temporary loss of control can *increase* approach behaviour as individuals feel motivated to regain control (Greenaway et al., 2015). This may be linked to confidence in one’s abilities and thus reflected in the experienced sample that was interviewed for this chapter. Domain specific expertise buffers against

cognitive biases as practitioners are able to bypass faulty reasoning and optimise outcomes (Braverman & Blumenthal-Barby, 2012) and a sense of ‘power’ over a situation can reduce the expectation for anticipated negative consequences leading to action (Mourali, et al., 2011). Commanders were positively motivated by anxiety as they were experienced and able to accurately and intuitively derive solutions to the decision problem (Kahneman & Frederick, 2002). Klein’s (1986) ‘recognition primed decision making model’ describes how experts hold accurate cognitive schemas that enable them to respond quickly and intuitively to challenging events due to their wealth of experience operating in their specialist domain. This contrasts to novice decision makers who risk using faulty heuristic processing and cognitive biases (Corr & McNaughton, 2012; Inman & Zeelenberg, 2002; Kahneman, 2003). Indeed respondents in the current study described how decision making was *challenging* but that this did not necessarily prevent action. It is possible that inexperienced commanders who feel less control of the situation may be more at risk of goal conflict and inertia. Indeed, ‘fear’ is associated with submissive behaviour and inaction as a behavioural mechanism to protect oneself from potential harm (Wilkowski & Meier, 2010). It is possible that more novice commanders would feel less control over critical incidents, leading to increased uncertainty, goal conflict and inertia. This is a potential avenue for further research.

4.5.2 Decision inertia at the social (interpersonal) level

Decision inertia was a product of goal conflict between approach goals and the desire to avoid anticipated negative consequences. Not only did goal conflict arise at the individual level, but it also emerged at the inter-agency level due to differences in role-specific priorities and goals. This is important, as extreme environments require skills not only in personal psychological management of extremes, but in terms of ensuring interpersonal management of the extreme environment is achieved (Orasanu & Liberman, 2011). Decision making derailed when there was conflict between goal-setting at the intra-agency level and at the inter-agency level as commanders often felt that external agencies prioritised intra-agency goals over collective responsibilities (Kleingeld et al., 2011). Inter-agency tension arose when agencies failed to consider or misunderstood one another’s’ goals and motivations. In terms of the main goals of each agency, it appeared that the PS held a broad collection of approach and avoidance goals related both directly and indirectly to the

incident; the FRS focussed on approach goals to facilitate casualty management but also held salient avoidant goals to protect their responders from high-risk procedures; and the AS prioritised action to treat patients. This led to multi-agency tension, when approach and avoidance goals conflicted.

For example, the FRS and AS shared approach goals to ‘save life’ and treat casualties, yet conflict arose as they differed in terms of their ‘prevent further harm’ goals. The FRS anticipated negative consequences associated to taking action by, for example, causing spinal injury to the patient when not following ‘gold standard’ procedures; whereas the AS anticipated negative consequences for not getting access to the patient in time. As such, the AS were motivated to ‘satisfice’ and select the first option to meet minimum thresholds, whereas the FRS were motivated to ‘maximise’ outcomes by taking the safer (but slower) option (White & Hoffrage, 2009). Differences in anticipated worst case scenarios thus induced inter-agency goal conflict over *when* to take action due to subtle differences in avoidance motivation. Indeed, the desire to maximise outcomes, or hold extremely high satisficing thresholds, is associated with more deliberative and slower decision making (Patalano & Wengrovitz, 2007; White & Hoffrage, 2009), which contradicts the AS goal of fast action. It is possible that these effects further relate to the time pressures experienced by different agencies, which is linked to satisficing behaviour (Alison, Doran, Long, Power & Humphrey, 2013). As the role of the AS commander is specific to having access to patients, it is possible that they feel intense time pressure to rapidly treat and take them to hospital as a result of governmental demands to have ‘zero tolerance’ of ambulance delays (NHS Confederation, 2012). Thus differences in the perception of time pressure may interact with cognitive processing strategies as a result of motivations, inducing goal conflict at the inter-agency level.

It also emerged that conflict between the PS and other agencies arose due to differences in temporal focus. The PS, as a function of their role, were not only motivated to ‘save life’ but further sought to ‘prevent further harm’ by establishing ‘normality’; associated with a desire to avoid anticipated negative consequences relating to the local community in the *future*. This was, again, a unique function of their role as the PS are responsible for upholding and protecting society both at times of crisis and in peace. It appeared that a poor understanding about one another’s roles and responsibilities led to inter-agency tension, as commanders did not

understand how their own goals may negatively impact upon other agency goals (Mathieu et al., 2000). FRS commanders described frustration about the lack of understanding other agencies had with regards to the time it took to execute complex procedures at incidents. Indeed shared mental models are important for effective team processing (Mathieu et al., 2000), which not only relates to task-relevant information but must include awareness of one's own and other's roles in order to inform expectations on how the team will work. Mental models need to be *relevant* to team members (Banks & Millward, 2007), and can help contribute to overall organisational trust, which is an important factor in facilitating team processing (Lee, Bond, Russell, Test, Gonzales & Scarbrough, 2010). Thus, at an inter-agency level, an increased awareness of agencies' roles and responsibilities is important to help commanders understand one another's goals and facilitate more effective decision making and team work.

4.5.3 Implications for findings

Fundamentally, conflict between approach and avoidance goals derailed choice both at the psychological and inter-team levels. In order to reduce goal conflict, training to more clearly identify the nuanced differences in goals at emergency incidents may be useful. For example, it may be beneficial to more clearly distinguish between the strategic goals outlined by JESIP (2013) to 'save life' and 'reduce harm'. This could facilitate an understanding of the conditions under which each of these priorities is most relevant. Currently, they are discussed as a singular and relatively vague strategic goal (JESIP Joint Doctrine, 2013), which could impede decision making performance and increase decision inertia (Alison, et al., 2015; Locke & Latham, 2006). The delineation of goals through increased awareness training may facilitate this process by increasing an informed awareness of the rationale for decision making. Training to facilitate increased awareness of mental processes (e.g. meditation/emotion regulation training) not only facilitates the ability to implement choices, but has further positive effects on anxiety, rumination and general mindfulness (Kemeny, Foltz, Cavanagh et al., 2011). Anxiety associated to causing harm through action and inaction increased cognitive conflict; thus a greater awareness of one's cognitive processing can reduce 'rumination' (i.e. the repetitive thinking associated with negative thoughts and failures; Martin & Tesser, 1996) and reduce the likelihood of decision inertia.

Cognitive awareness training may have further positive effects on decision making at the inter-agency level. Effective interdisciplinary teams tend to have shared vision, respect and understanding for one another's roles (Nancarrow, Booth, Ariss, Smith, Enderby & Roots, 2013). Increasing understanding about one's own goals and rationale could indirectly increase shared awareness at the team level. It is possible that inter-agency training that specifically focuses upon decision making and rationale, as opposed to more practical and procedural exercises to test skills, could facilitate a shared understanding. A greater understanding of roles may not only facilitate choice, but may further increase feelings of benevolence between agencies that could reduce anxiety and free up cognitive resources. For example, if the PS perceived other agencies as being aware and respecting the need to 'prevent further disruption to normality', then the salience of this goal may reduce as they anticipate trust and benevolence from other agencies to help them achieve this goal. Indeed perceived trustworthiness based upon benevolence is important in dynamic inter-team settings (Rusman, van Bruggen, Sloep & Koper, 2010).

4.6 Conclusion

This chapter has presented inductive findings that were derived from qualitative interviews with commanders from the emergency services. It was interested in how goals interacted with decision making; specifically by focusing on how goal conflict may contribute to decision inertia. Two competing goals emerged: 'save life' – the desire to take fast action in order to *approach* positive outcomes; and 'prevent further harm' – the desire to *avoid* anticipated negative consequences. Anticipated negative consequences were counterintuitively associated to anxiety for causing harm by taking action, and also harm by *not* taking action. This was suggested to be a function of the roles and responsibilities of commanders to both 'save life' whilst further seeking to 'reduce harm'. Anxiety was a product of anticipated negative consequences, which led to goal conflict and uncertainty that was attributed to passive avoidance and decision inertia. Fundamentally, commanders were distracted from taking positive 'save life' action when they were thinking about potential negative consequences that violated goals to 'prevent further harm'. Goal conflict also arose at the inter-agency level as a result of poor role understanding and inconsistent goals. Recommendations for overcoming these effects relate to improving the awareness of commanders in terms of delineating different types of

goals, which may be achieved through training. Chapter 5 will further analyse the same data set, however with a focus on the impact of uncertainty on decision making.

Chapter 5: Using the endogenous / exogenous taxonomy of uncertainty to explore the situational and social challenges associated with emergency incident command and decision inertia

5.1 Abstract

This chapter describes how command challenges associated to uncertainty contributed to decision inertia in the emergency response environment. The Critical Decision Method (Crandall, Klein & Hoffman, 2006) was used to interview n=31 commanders from the Police Service (n=12), the Fire and Rescue Service (n=15) and the Ambulance Service (n=4). In support of previous research on uncertainty in critical incident domains, it emerged that challenges could be themed into two overarching types of uncertainty: (i) endogenous complexities, based on the unique characteristics of the incident; or (ii) exogenous complexities, based on the features of the system being used to manage the incident (i.e. the team) (Alison, Power, van den Heuvel & Waring, 2014). Specifically, endogenous uncertainties included: (i) lacking, ambiguous or too much information; (ii) unreliable or unavailable resources; (iii) time pressure; (iv) social management (public and media); and (v) adapting to and coping with budget cuts and austerity. Exogenous uncertainties reflected: (i) communication problems regarding insufficient updating and miscommunication; (ii) poor role understanding, both in terms of own obligations and assumptions about other agencies' responsibilities; (iii) trust issues associated with distrust, mistrust and the paradox of trust; and finally (iv) competitiveness within the command environment as a product of competing and conflicting goals. Recommendations to try and improve overall uncertainty by targeting *exogenous* challenges is suggested (Alison et al., 2015).

5.2 Introduction

The Police Service (PS), Fire and Rescue Service (FRS), and Ambulance Service (AS) are responsible for responding to a wide variety of emergency incidents. They can range from relatively low-key and low-impact incidents (e.g. trips and falls, shop lifting) to large-scale major disasters (e.g. earthquakes, terrorist attacks). The majority of decision making research that has explored the challenges to emergency responding has tended to focus on major disasters, acknowledging that although they may be rare, they can lead to potentially catastrophic consequences that can far

outlast the incident, thus making them noteworthy of research (Boin & 't Hart, 2010). Yet, their rarity, the ability for researchers to gather data from such events is limited; instead studies have relied upon data collection from training exercises and simulations (e.g. Alison, Power, van den Heuvel, Humann, Palasinski & Crego, 2015; Bharosa, Lee & Janssen, 2010; Salmon, Stanton, Jenkins & Walker, 2011). Although research from training events can contribute to the understanding potential issues that may arise during emergency incidents (e.g. information and communication issues), they have less scope to provide insight into the *personal* and *emotional* experience of responders. Even when simulations are incredibly immersive (Alison, van den Heuvel, Waring, Power, Long, O'Hara & Crego, 2013) respondents are aware that the exercise is fictitious and thus the emotional impact of such events, especially with relation to the consideration of potentially aversive long-term consequences (e.g. job loss), will be reduced. Simulations also tend to focus on large-scale disasters rather than complex incidents that are *smaller* in scale. Yet, as emerged during the course of the interviews for this chapter, commanders often perceived *smaller* incidents (e.g. road traffic collision) as more *personally* challenging than major disasters, especially in terms of testing their emotions. In fact, many respondents chose to discuss *smaller-scale* incidents over large-scale ones as they found them more challenging.

This chapter will describe the key challenges associated with emergency responding, derived from the subjective experience of commanders. It is important to note that the findings are large and varied in scope, identifying numerous challenges of which many warrant further investigation. Yet this was beyond the scope of this PhD due to both time limitations and the aim to *explore* the general concept of decision inertia in complex emergency incidents. Thus, a brief discussion of all identified sources to uncertainty is included. Specifically, this chapter will:

- (i) Highlight the complex nature of emergency incidents
- (ii) Identify how teamwork can facilitate decision making:
 - a. Describe the Input-Process-Output model and define 'emergent states' and outline the positive and negative impact of:
 - i. Cognitive emergent states (e.g. role understanding)
 - ii. Affective emergent states (e.g. trust)

- (iii) Present the results of this chapter, which are categorised according to the endogenous / exogenous taxonomy
- (iv) Discuss implications for reducing uncertainty via interventions to target exogenous sources relating to teamwork

5.2.1 The complex nature of the emergency incident

Emergency incidents are complex. They are characterised by unknown and ambiguous information (Bharosa et al., 2010), involve high risk, high-stakes and time pressure (Chen, Sharman, Rao & Upadhyaya, 2008) and often cause cognitive overload and stress for the emergency responders involved (Paton & Flin, 1999). To add to this complexity, the need for joint coordination between different emergency response agencies is increasing (Janssen, Lee, Bharosa & Creswell, 2010). Cross-agency working is not only required at major incidents (Salmon, et al., 2011) but is increasingly used at smaller scale incidents due to the increased desire (in the UK) for ‘interoperability’ (House, Power & Alison, 2014); defined as *‘the capability of organisations to exchange operational information and to use it to inform their decision-making’* (p. 12, NPIA, 2009). Interoperability involves both *inter-agency* working, where agencies work towards joint and collective goals, and *multi-agency* working, where agencies operate in parallel to one another (Charman, 2014). For example, in the event of a potential acetylene cylinder explosion, the FRS will be required to stabilise the cylinder, whilst the PS manage cordons and evacuation, and the AS are on stand-by in case of potential casualties. Each agency’s roles are distinct, yet they rely on one another to function effectively. Interoperability thus adds complexity to the emergency incident as it can increase confusion and uncertainty about roles and responsibilities within the inter-agency team (Curnin, Owen, Paton & Brooks, 2015) by blurring professional boundaries (Brown, Crawford & Darongkamas, 2000).

A number of studies have taken a top-level approach to identify the key challenges associated with the emergency responding. Salmon et al (2011) analysed a multi-agency training exercise for the response to widespread flooding which involved the emergency services, the military and local/civilian authorities. They identified seven key barriers to multi-agency coordination relating to organisational problems (e.g. ambiguous command structure), poor information management,

inefficient communications, inadequate situation awareness, insufficient equipment, poor understanding of cultural differences; and limited inter-agency exposure through training. Similarly, Chen et al (2008) identified how uncertainty, time pressure, casualty risk, resource shortages, large-scale impact and damage, infrastructure disruption, multiple authorities, conflicts of interest and the demand for timely information can impede the response to emergencies. Taking a more reflective approach in reviewing post-mortem reports of large-scale disasters, Boin and 't Hart (2010) identified six 'avoidable pathologies' of disaster response relating to bad planning, an obsession with full information, communication breakdowns, overreliance on command and control, underestimating the usefulness of the media, and a lack of concern for post-incident consequences. Fundamentally, emergency incidents are inherently ambiguous and complex; it is the associated experience of uncertainty that makes decision making difficult.

Endogenous uncertainties describe the characteristics of the emergency that are a product of and specific to the emergency event (e.g. time pressure, multiple casualties, limited resources). This makes them difficult to *directly* control as they are external to human manipulation (Alison et al., 2014). Exogenous uncertainties describe the characteristics of the operating system (e.g. emergency response team) who are responding to the emergency event, and are amenable to intervention through developments in technology, training and organisational practice that may facilitate efficient operating. This means that exogenous interventions may *indirectly* lessen the uncertainty associated with endogenous features of the incidents as decision makers are more able to cope with demands (Alison et al., 2014). For example, a coordinated team will respond more efficiently to an emergency incident, which can indirectly reduce endogenous uncertainty associated with complexity. Thus, this chapter will focus mainly on the exogenous challenges relating to team processing as they offer more scope for intervention. Furthermore, recent changes in the strategic direction of the UK emergency services mean an increased focus on 'interoperability' through the 'Joint Emergency Services Interoperability Programme' (JESIP), which aims to increase the co-location, communication, coordination, joint understanding of risk and shared situational awareness between the blue lights services (JESIP Doctrine, 2013), in order to increase overall resilience against major disasters, such as the increased threat of globalised terrorism (Comfort

& Kapucu, 2006; Koblenz, 2011) and extreme weather events (e.g. flooding) as a result of climate change (Pollock, 2013). Thus the exploration of *challenges* to team processing at emergency incidents is a worthy topic of research.

5.2.2 The importance of teamwork at emergency incidents

Imagine a road traffic collision involving 3 cars on a busy motorway. One car has been flipped onto its roof and contains one male driver and one female passenger, both in their mid-twenties. The female passenger is trapped in her seat and screaming, whilst the male driver is unconscious and bleeding at the wheel. A second car involved in the incident has veered into a ditch, and contains an elderly lady who is immobilised by shock and a hysterical infant strapped into her car seat. A third car, the cause of the accident, contains an uninjured teenage male who had tried to flee the accident but crashed into the central reservation further up the motorway. The FRS are the first at scene with one pump (fire engine). The FRS watch manager (lead firefighter) radios their control room to request a senior commander and additional pumps, whilst firefighters begin to collect information from victims in the crash area (to relay to paramedic colleagues on arrival) and start to consider methods for casualty extrication (e.g. roof removal, door removal). Meanwhile, a two-person Ambulance team has arrived, who also request further assistance from their control room. The paramedics begin to prioritise patients at the scene using the P1 (critical), P2 (needing attention) and P3 (walking wounded) classification. The chief paramedic liaises with the watch manager from the FRS to prioritise casualties and establish casualty extrication needs (i.e., slower but safer or rapid but riskier). During this time, a station manager (senior FRS representative) arrives and a handover procedure takes place from the watch manager. The PS are now also in attendance, who, following consultation with other agency representatives and discussion with the Highways Agency are closing the motorway and establishing traffic diversions. Registration number plate checks reveal that the teenage male's vehicle is stolen, and so an investigative PS team have also been mobilised. Each agency has its own commander who is responsible for making decisions at the intra (within) team level, whilst also coordinating with other agencies at the inter-team level. For example, the initial FRS commander took an intra-agency decision to request additional resources and the PS commander has identified the accident as a potential crime scene. However they must also coordinate

with one another; as the FRS discuss inter-agency actions on patient prioritisation and casualty extrication with the AS; and the PS establish a compromise with other agencies to ‘save life’ whilst protecting a potential crime scene. Teamwork is thus essential.

A team is defined as *“two or more people who interact, dynamically, interpedently, and adaptively toward a common and valued goal/objective/mission, who have each been assigned to specific roles or functions to perform”* (Salas, Dickinson, Convers & Tannenbaum, 1992; p. 4). Thus, in emergency response team settings, commanders not only consider their *intra*-team goals that align with their organisational responsibilities, but must further consider interactive *inter*-team goals. For example, as described in Chapter 4, a common *inter*-agency goal is to ‘save life’, which requires both intra- and inter-agency coordination of action (van den Heuvel, Alison & Crego, 2012). Teamwork is the process of working towards collective goals (Millward, Banks & Riga, 2010), which can be derailed when agencies hold inconsistent priorities or a poor understanding of one another’s roles.

5.2.2.1 The Input-Process-Outcome model and importance of ‘Emergent States’

The Input-Process-Outcome (I-P-O) framework describes how organisational teams transform task inputs into meaningful and goal-directed outcomes (Marks, Methieu & Zaccaro, 2001; Mathieu, Heffner, Goodwin, Salas & Cannon-Bowers, 2000; Millward et al., 2010). Inputs are the conditions of the decision environment that exist prior to decision making (e.g. task, team, organisational or individual characteristics) and outcomes are the consequences of team-activity relating to performance quality, team longevity and the affective reactions of team members (Hackman, 1990). The psychologically interesting aspect of this framework is the ‘process’ element; which refers to *“members’ interdependent acts that convert inputs to outcomes through cognitive, verbal and behavioural activities directed toward organising taskwork to achieve collective goals”* (Marks et al., 2001, p. 357). Team processing is effectively ‘teamwork’, with examples including strategy formulation, cooperation and communication (Mathieu et al., 2000). Team processing represents the way teams collectively process information in order to formulate and implement plans of action in line with their common goal (e.g. ‘save

life'). For example, a multi-agency team that communicates using non-specialist language will process information more effectively; whereas the use of intra-agency specific terminology will diminish inter-team understanding.

A team's ability to operate is dependent upon 'emergent states'. Emergent states are "*properties of the team that are typically dynamic in nature and vary as a function of team context, inputs, processes and outcomes*" (p. 357, Marks et al., 2001). They are the team-level cognitive, affective and motivational features that influence the effectiveness of teamwork (Millward et al., 2010). Examples of *cognitive* emergent states include the establishment of shared mental models (Cannon-Bowers, Salas & Converse, 1993) and an informed understanding of one another's roles (Toegel, Kilduff & Anand, 2013); examples of *affective* emergent states include feelings of psychological safety (Edmondson, 1999) and empowerment (Mathieu, Gilson & Ruddy, 2006); and *motivational* emergent states are the cohesive motivational drives of team members towards collective goals (Bossuyt, Moors & De Houwer, 2014).

Emergent states develop over time as an accumulation of multiple decision 'episodes' and 'sub episodes' (Marks et al., 2001; Mathieu & Button, 1992). For example, the road traffic collision example represents a team decision 'episode', with sub-episodes including decisions on the best extrication method to use. A team's experience across multiple decision episodes helps to inform their understanding of the team environment and can facilitate (or inhibit) their collective functioning (Hackman, 2002). Learning between episodes occurs during 'transition phases' (or 'downtime' from decision making) through interpersonal processes relating to 'conflict management' and 'confidence building' based upon what happened during the 'action phase' of the decision task (Marks et al., 2001). In other words, individual team (and sub-team) members learn about one another's roles during multiple decision episodes, and it is these lessons and experience that inform the 'emergent states' and effectiveness of teamwork during subsequent decision episodes. Thus, emergent states are dynamic features of a team that can change over time, and may vary across decision tasks (Marks et al., 2001). The multi-agency team responding to a *routine* incident (e.g. house fire) may have a fairly accurate understanding of each other's roles and responsibilities, but when faced with a more novel incident (e.g. bridge collapse), then the understanding of one another's roles

and responsibilities diminishes; leading to, for example, disagreements between over who takes primacy at scene. Likewise, a positive or negative experience with other individuals during a decision episode can increase or decrease the willingness for team members to cooperate at subsequent tasks (Peterson, Owens & Martorana, 1999).

Organisational teams are interconnected and interpersonal, and represent social groups that exist between decision making episodes (Marks, et al., 2001). Research on social ingroups and outgroups has identified how individuals can hold negative attitudes against an entire social outgroup, based on a single negative experience with one team member (Paolini, Harwood & Rubin, 2010). For example, a confrontation between a police officer and firefighter may cause the individuals (and their colleagues) to hold negative attitudes against the entire social outgroup at subsequent incidents. This was found in research exploring ‘cultural interoperability’ in the emergency services due to historic and inherent organisational mistrust (Charman, 2014). Furthermore, if members of organisations feel that their role is threatened by other groups (e.g. due to mergers or streamlining), then the negative bias against outgroup members increases as individuals become more competitive (Terry & Callan, 1998). It is important therefore, that team-level emergent states are positive and resilient across incidents to ensure effective team processing. Two emergent states that will be explored in more detail are: (i) cognitive emergent states; and (ii) affective emergent states.

5.2.2.2 Cognitive emergent states: Role understanding

An example of a cognitive emergent state is a team’s ‘shared mental model’. Mental models are the cognitive schema in which individuals store descriptions, explanations and predictions about their knowledge of the world (Rouse & Morris, 1986). They can include declarative knowledge (facts and figures); procedural knowledge (the steps required to perform a type of action); and strategic knowledge (overriding knowledge on application of rules) (Cooke, Salas, Cannon-Bowers & Stout, 2000). Mental models represent cognitive emergent states as they develop over time through repeated exposure within the team environment and stored at the cognitive level. For example, repeated exposure between PS, FRS and AS colleagues will help an understanding of roles and responsibilities and, importantly, how this

aligns with their own. Shared understandings facilitate teamwork and the achievement of collective goals as they help teams to coordinate their actions by reducing ambiguity. An important type of mental model when operating in multi-team settings is knowledge about one's own and other team members *roles* within the team network (Mathieu et al., 2000). For instance, teamwork at a road traffic collision would be facilitated by shared mental models on roles; that the PS will establish cordons, that the FRS will rescue casualties, and that the AS will treat patients following extrication. Shared role understanding helps individual team members to form accurate expectations about the behaviour of other team members (Cannon-Bowers, Tannenbaum, Salas & Volpe, 1995) which can facilitate teamwork and processing (e.g. relevant communication; Mathieu et al., 2001).

When team members lack understanding about one another's roles (i.e. limited or inaccurate awareness of others' roles and responsibilities) then this can cause poor task outcomes associated with reduced or impeded information sharing (Weller, Janssen, Merry & Robinson, 2008). A poor understanding of organisational structure in multi-team settings, due to the increased number of sub-teams and a lack of superordinate direction, biases team processing towards inward intra-team tasks, over collective inter-agency goals (Alison, et al., 2015). Ambiguity reduces the willingness for team members to work collectively, causing them to focus on more certain knowledge associated with their own (intra-team) responsibilities. Poor role understanding can increase *irrelevant* communications (e.g., informing a strategic commander about detailed procedural operations), which degrades team performance as members become cognitively overloaded and distracted by non-goal related information (Banks & Millward, 2007). For example, a paramedic does not need to inform a firefighter about the intricate details of a patient's injuries, they simply need to state how quickly a patient needs medical attention, which informs the firefighter's decision on method for extrication (i.e. slower but safer or rapid but risky). Thus, the acquisition of shared (and relevant) mental models with reference to role understanding is important cognitive emergent state to facilitate team processing and overall effectiveness.

5.2.2.3 Affect emergent states: Trust

In terms of affective emergent states, trust is an important factor in teamwork. Trust, in organisational settings, is the assumption by one individual / organisation that advice provided by another individual / organisation is reliable (Rotter, 1980). It is an important affective emergent state for emergency responding, as trust can expedite decision making in high-risk settings (Das & Teng, 2004). Indeed, high-risk decision making in a simulated hostage negotiation incident was influenced more by social emergent states such as trust, than endogenous features relating to the features of the emergency incident (Alison et al., 2014). Trust interacts with cognitive emergent states relating to role understanding, as a shared understanding of roles can be developed through regular contact with social others as a result of increased trust (Dirks & Ferrin, 2001). The development of trust changes over time in response to the interpersonal experience of the team members: positive experiences facilitate trust in the future; whereas negative experiences limit or reduce trust. When team members identify with their team on an emotional / social level then they are more committed to their team and more likely to engage in self-regulating practices (Millward et al., 2010). Positive affective states encourage sustainability within a team (Ellemers, 2001) and are associated with an increase cooperation and commitment to collective goals (Bishop, Scott & Burroughs, 2000). It can also facilitate feelings of empowerment (Kirkman, Rosen, Tesluk & Gibson, 2004) and psychological ownership (Edmondson, 1999) within teams, which can increase overall team effort (Mathieu, et al., 2006). Thus, trust is an important emergent state that facilitates collective action.

Importantly, when exploring emergency response teams, it is important to acknowledge that individual team members will not always work with the same individuals from day to day. Different shift patterns and specific expertise within sub-branches of the emergency services make the team environment temporary. Meyerson, Weick and Kramer (1996) explored trust in temporary teams and found that, rather than trust being based on affective relationships, temporary organisations rely on ‘swift trust’; the belief that others are *capable* of providing relevant information regarding uncertainty, risk and vulnerability. This demonstrates the distinction between ‘cognitive trust’; which describes faith in another’s abilities to complete a task, and ‘affective trust’; the emotional faith one holds in another

(McAllister, 1995). Indeed, *cognitive* trust has been found to have a greater influence on decision making in teams than affective trust (Parayitam & Dooley, 2008). Faith in another's abilities and competence can facilitate 'swift trust' in temporary or dynamic decision making teams in the absence of interpersonal relationships (Meyerson et al., 1996). Indeed, a commander does not need to know a member of their team on an *interpersonal* level to trust, but can instead rely on swift (cognitive) trust based on their role-related competencies. This was evidenced in research on temporary emergency response teams, which found swift trust and team effectiveness was facilitated by role clarification (Curnin, Owen, Paton, Trist & Parsons, 2015). Once more, it is thus important that teams have a clear understanding of each other's roles, skills and competencies in order to facilitate swift trust in dynamic teams (Meyerson, et al., 1996).

5.2.3 Summary

This chapter has thus far outlined how emergency incidents are inherently complex. This may be due to both endogenous features of the critical incident and the exogenous characteristics of the response team, which both contribute to overall uncertainty (Alison et al., 2014). By focusing on exogenous team features that are more amenable to intervention, it appears that cognitive (mental models, role understanding) and affective emergent states (trust) can positively influence team processing effectiveness. Awareness of one's own and others' roles within a team (cognitive emergent state) facilitates 'trust' (Curnin et al., 2015) as team members engage in positive self-regulation practices (Millward et al., 2010), which increase commitment to collective goals (Bishop et al., 2000). An awareness of one another's roles and responsibilities facilitates swift trust (Meyerson et al., 1996) as, for example, the FRS have faith in paramedics to provide accurate advice on how quickly they need to extricate a casualty, which will inform their own decision making on which method to use. Shared mental models help individuals to form accurate expectations about the behaviour of other team members (Cannon-Bowers et al., 1995), which creates shared collective affective states of empowerment (Kirkman et al., 2004) and psychological ownership (Edmondson, 1999); increasing overall team efforts. Thus this chapter sought to analyse interview data from experienced emergency commanders to explore how different types of uncertainty, relating to both endogenous and exogenous sources, may interact with decision

making. Although findings include both endogenous and exogenous challenges, this introductory discussion has hopefully helped highlight to the reader how many of the negative effects of these challenges, which contribute to decision inertia, can be limited via improved teamwork.

5.3 Method

5.3.1 Procedure

Chapter 4 provides a full discussion of the data collection procedure used for the interview data. In brief, commanders (n=31) from the PS (n=12), FRS (n=15), and AS (n=4) were interviewed using the Critical Decision Method (CDM); a form of Cognitive Task Analysis (Crandall, Klein & Hoffman, 2006). They were asked to recall a “*difficult decision*” that they had faced in past when responding to an incident that was “*especially challenging*” with “*high consequences*” that would be “*very difficult to reverse*” (Appendix One). Interviews were audio recorded and transcribed by the primary researcher, and had a mean length of 1 hour, 39 minutes and 18 seconds.

5.3.2 Data Analysis

Grounded Theory, which involves an inductive ‘bottom up’ process to interpret theory from the data, was used to analyse the data (Glaser & Strauss, 1965). The focus of analyses was on the main challenges to decision making that were identified by commanders as contributing to uncertainty, and derailing choice. Following analysis of the data, findings were split according to the endogenous / exogenous taxonomy of uncertainty, which was also derived from research within the emergency response domain (Alison et al., 2014). This split the causes of uncertainty into two general areas: (i) uncertainty due to characteristics of the emergency incident (endogenous); and (ii) uncertainty derived from the characteristics of the ‘operating system’ (i.e. team) responding to the incident (exogenous).

5.4 Results

There were nine different sources of uncertainty that were described by commanders, five of which were eventually coded as endogenous sources, which related to uncertainty affiliated to: (i) information, (ii) resources, (iii) time

management, (iv) people management (i.e. public and media), and (v) budget cuts and austerity. The remaining four sources of uncertainty were coded as exogenous and referred to uncertainty associated with: (i) communication, (ii) role understanding, (iii) trust, and (iv) competition. Table 5.1 outlines each of these nine sources of uncertainty and the reasons for why they contributed to uncertainty.

Type of uncertainty	Source of uncertainty	Reason for uncertainty
Endogenous	Information	<ul style="list-style-type: none"> • Lack of information • Too much information
	Resources	<ul style="list-style-type: none"> • Lack of resources • Unreliable resources
	Time management	<ul style="list-style-type: none"> • Time pressure • Administrative demands
	People management (public; media)	<ul style="list-style-type: none"> • Public inside risk area • Public outside of risk area • Social media and potential criticism
	Budget cuts and austerity	<ul style="list-style-type: none"> • Reduced capacity • Increased demands • Role instability • Emotional demands
Exogenous	Communication	<ul style="list-style-type: none"> • Insufficient updating • Miscommunication • Inaccurate assumptions
	Role understanding	<ul style="list-style-type: none"> • Erroneous assumptions on external agency capabilities • Poor understanding of own responsibilities • Operating in isolation
	Trust	<ul style="list-style-type: none"> • Distrust abilities • Mistrust intention • Trust paradox
	Competition	<ul style="list-style-type: none"> • Competition for command (intra-agency) • Competition for primacy (inter-agency) • Self-oriented personalities and egos • Desire to take action

Table 5.1: The nine sources of uncertainty that were identified by emergency response commanders

5.4.1 Endogenous challenges to emergency incident commanding

5.4.1.1 Information

Commanders described how unavailable or unknown information limited their ability to command the emergency: *“the lack of information was quite – because well how many patients?” (A4); “that was probably the most challenging part of the*

job the lack of solid information” (F3); “where it probably became difficult from the outset was you’ve got very, very limited intelligence really” (P3). Lack of information was a key inhibitor to decision making: “what we live and breathe on in this organisation is information and intelligence and without information we can’t make a decision” (P4), which was associated with uncertainty and deliberation: “I sort of mulled it over in my head I was like well I didn’t know what I was going to be greeted with” (F14). The lack of information was particularly problematic for commanders who were remote to the emergency incident and so had to rely on the information provided by other team members: “you’re making those decisions from a remote location and relying on information coming in from other people and assessment from other people” (P2); which was especially challenging for FRS commanders who rely heavily on visual information to perform their role: “It’s difficult to make command decisions remotely. I mean police are better at it because they will use verbal reports or effective use of CCTV or other visual images” (F7).

Decision making was also challenged when there was too much information, as this increased difficulty in identifying relevant pieces of information: *“you’re getting information from the police, you’re getting information from the local authority from the people, the company... So it’s a whole range of information – the key is to be able to sort out the bits that are relevant and then come up with a command structure so that you don’t get overwhelmed” (F10). When information was rich, dynamic and rapidly changing, commanders struggled to keep pace with the situation: “It was like trying to run up a sand dune – you keep sliding down because as soon as you get around a corner or a new scenario and you’ve got to deploy your resources. Then you move about 100 feet and you’ve got another one” (P1). Furthermore, excessive information induced trade-off difficulties between attending to new information and focusing on current tasks: “you’re really stuck because you can’t write and you can’t think at the same time” (A4). However, it appeared that commanders were self-aware of the potential negative outcomes associated with information overload and incorporated it into their decision process by relying on other team members to undertake information processing roles; this was most salient to the FRS when discussing limits of ‘spans of control’: “I could’ve potentially could’ve left the whole job with the group manager but it would’ve been right on the limits of spans of control” (F15).*

5.4.1.2 Resources

Commanders were also challenged at major incidents when resources (e.g. staff, equipment) were limited: *“lack of resources. You know if I’d have turned up there, with our full turn out, my decisions would’ve been different”* (F5). Resource limitations were exacerbated when incidents were novel or unique, requiring specialist assets: *“maybe a difficult part of that was to ensure that we had the appropriate level of resources and also the appropriate level of trained resources”* (A2), and expert knowledge: *“it was technically it was a difficult situation because we only had very limited onsite expertise to try and resolve this”* (F7). The reliability of resources when they were available further contributed to uncertainty, as commanders expressed cynicism over the technological capacity of seemingly basic tools such as mobile phones: *“the biggest complaint we have post-incident is communications... Not so much individuals it’s the technology”* (F11). Fundamentally, a lack of and/or unreliable resources increased uncertainty at the emergency incident as it limited the commanders’ abilities to make decisions and take action: *“I was fast approaching information overload. Made worse by lack of resources”* (F5).

5.4.1.3 Time management

Throughout all the emergency incidents discussed by commanders, the negative impact of time pressure was salient: *“there was a constant flow and these decisions were coming thick and fast all the time. So talk about being under pressure. It was probably the most pressurised position that I have ever been in”* (P4). Respondents described an inability to estimate the passage of time when placed under pressure, as time subjectively passed more quickly than it did in reality, exacerbating time pressure: *“you could be like there 10 hours but it feels like 20 minutes because it’s just one decision after another (A3); “if you’re sitting for 15 or 20 minutes waiting for an update 15 or 20 minutes is a long time. If you’re on the incident, 15 or 20 minutes will go like that *clicks fingers*”* (F7). Perceived time pressured interacted with concerns on resource limitations, as commanders were worried about time delays associated to coordinating resources: *“so I requested 10 ambulances as well. Obviously aware that they were going to take a while to come because of the distances they were going to be travelling”* (F14). Commanders were anxious that

the rapidity of the incident ground exceeded the time it took them to make decisions and execute action, leading to feelings of helplessness: *“when it’s going wrong there’s a certain period where you are helpless. You are helpless and whatever is going to be is going to be because you can’t catch it up quickly enough. What I mean by that is by the time you’ve made a decision about something the circumstances have changed. So by the time you say well actually right let’s try and put a cordon on them there. You try and get that out to the operational or bronze commander or via your own radio and it’s too late. Something else has happened somewhere else”* (P3). Counterintuitively however, when time pressure as a result of a protracted incident over a number days, the lack of time pressure appeared to negatively interact with the desire to ‘save life’ and take action, as respondents struggled to know when to stop action: *“what does the fire and rescue – what’s the kind of value that runs right through us is we pride ourselves – we think we do anyway – is that we ‘can do’ and whatever the challenge is we’ll deal with it. And then to look at it in sort of the cold light of day and say we can’t do anything”* (F10).

From an organisational perspective, administrative demands to complete paperwork also interacted with time pressure, as commanders expressed frustration at having to document their actions whilst juggling the demands of the ongoing incident: *“every patient that you have you’re supposed to have a patient report form and that’s the only thing with a major incident is the audit trail is never as good as it could be because everyone gets ahhh”* (A4). Interestingly, PS commanders were less critical of the need to complete paperwork, and instead gained confidence from it: *“I made copious notes on the log on my rationale so that people knew the best interests were at the hearts and there was a balance”* (P8). They often relied on paperwork and documentation, such as the decision making model, to help them cope with rapidly moving and evolving incidents: *“you keep going around this national decision making model looking at the intel, looking at the threat, looking at your powers particularly in the terms of legal and you continually reassess”* (P3). However, both AS and FRS respondents described how the need to complete paperwork was impractical for their role: *“I don’t think we’re in a position where we can do it at the scene – I think that’s negative for a fire officer to sit there making notes”* (F3). Inconsistent estimates on time management also contributed to multi-agency disagreements as agencies lacked an understanding of timelines for specific

actions of other agencies (e.g. extrication of casualties by FRS during road traffic collisions): *“obviously we’ll get them out as quick as we can get them out. It’s not like we’re deliberately being slow it was just the nature of it” (F14).*

5.4.1.4 People management (public; media)

Uncertainty was also related to the management of non-emergency service personnel at the incident scene (i.e. public and media). During the initial phases of response, respondents were keen to reduce uncertainty associated to the location and number of ‘victims’ to the emergency: *“thinking about it there was this thing of like how do we know how many people we’ve got? Because there’s one dead on the embankment and there were bits of fires going off everywhere you know and it’s like how do you know there’s not more people?” (A4)*, as well as protecting the members of the wider public who are external to the incident: *“very, very quickly the scene was congested there were all kinds of young people, family members were turning up” (F1).*

Management of the public was more difficult when individuals were uncooperative to the requests of the emergency services: *“now there was some real reluctance of those residents to come out of that house but I managed to brief the police no you need to get them out” (F15).* This issue was especially challenging for the PS, whose role required them to both manage cordons and protect the public from further harm at the incident ground: *“when you’ve got lots of people in what becomes a confined space the fear that someone is going to get injured is fairly significant” (P10)*, whilst also ensuring normality was maintained as much as possible: *“it was a Friday afternoon, which is probably quite important in terms of some of the logistical difficulties” (P5).* PS respondents described proactive decision making to try and manage the public by predicting their behaviour using empathy: *“when people can’t get where they want to be and they’re getting jostled and people are not used to being in crowds that’s an issue. People react differently to the way you might expect them to react” (P10).* The PS were also uniquely challenged in dealing with members of the public who were actively hostile towards them: *“it was the unknown and we didn’t know what type of hostility we were faced with” (P1).* This created additional uncertainty as they were cognisant of the potential for negative reactions of the public to their actions: *“if we start using legislation and*

using it potentially incorrectly they know out there their rights which then causes us issues because if we do stuff we're not allowed to because of misinterpretation and different views you've then got issues around the reputation of our organisations" (P7), underpinned by a feeling of responsibility to guide the behaviour of the public in a law abiding way: *"you've got a group of people we don't necessarily want to criminalise them but at the same token we want to get them out of the city centre before they cause themselves and/or others or get involved in disorder"* (P12).

In addition to uncertainties associated with the management of the public at emergency incidents, respondents also described how uncertainty was attributed to the management of social media: *"with the media and the public perception these days we oft are more accountable for everything that we do than ever before"* (P4), creating increased anxiety attached to public criticism: *"I mean you can youtube it there's hundreds of people with phones you know look at this look at what's going on and all the rest and then you can see it from a fair way and it's that sort of pressure"* (F13). Social media increased feelings of exposure in commanders: *"you've got the gaze of the local community, you've got the gaze of the people with their smart phones and you've got CCTV and the press there"* (P1), which added a further layer of complexity decision making: *"I accept that we shouldn't really be worried about what press headlines read because that's the least important ...But you can see how those pressures around press and media finance and all the other things that come on and necessarily at the back of your head when you're trying to make sort of decisions on what to do"* (P10).

From a positive perspective, commanders acknowledged that the media could facilitate information gathering: *"best bit about whatever happens in a major incident is Sky News because in every control centre wherever you go you will find a telly and the telly is always set to sky news because that is the one thing you can guarantee the helicopters will be there"* (A4), and the distribution of public information: *"you rely on the media. Because it's the whole thing about what our trying to get messages out to staff or trying to get messages out to Joe public is now put a message through the media"* (A4). However, there was concern associated to misinformation via the media, which could make the situation worse: *"local radio might've let some information out and then for all of a sudden for whatever reason hundreds of people turn up at accident and emergency"* (F7). Interestingly, when

commanders discussed the media they tended to discuss abstract examples: “*you always have to think about that photo opportunity when you’ve got an old woman shopping with the grandkids and you’ve got a police officer using his baton to repel someone*” (P1), or associated with vicarious learning attached to famous media stories: “*you know you look at Hillsborough – it’s left a sort of mark for 25 years hasn’t it? It hasn’t ended. It’s still going on. You know Dunblaine. You can think of all of those things – there’s always a legacy*” (F1). Anxiety about the media was thus more closely related to imagined states, rather than personal experience.

5.4.1.5 Budget Cuts and Austerity

A final endogenous challenge that emerged from the data was the negative impact of austerity measures and government budget cuts: “*I guess because of austerity none of us have been immune from that. You know we’ve all been challenged by austerity. You know in our own budgets being cut significantly*” (F1). Budget cuts have reduced the number of available resources significantly: “*massive implications around the availability of ambo and fire and obviously you’re aware that fire and ambo are reducing in their resources*” (P6), which has increased pressure on commanders to resolve incidents quickly to free up resources as soon as possible: “*I think the resource thing is going to be the greatest issue going forward because I think everyone look at it now and go well you want to try and bring the incident to a close straight away*” (F1). Commanders described pressures to limit the financial expense of operations: “*because of that *money sign with fingers* Because of the overtime. Or because you are tying a lot of resources up and they may be needed elsewhere. You are stripping resources from the brigade*” (F3), and were frustrated at how organisational streamlining limited their ability to provide gold standard care as responders were required to work to a higher capacity: “*so it’s about ‘where do you draw the line?’ And like whereas we’d always go the extra yard and I think in some cases we still do – but I think eventually you’ll go ‘well now that’s not, we’ve done our bit now and we’ll have to push it back’*” (F1). Budget cuts were also blamed for creating a competitive environment *between* agencies (especially with non-blue light organisations), as there was competition to justify one’s role: “*they were being threatened by big cuts so I suppose if someone else another organisation can come and do what you’re doing it maybe justifies the cuts*

whereas if you say well I'm an expert in this and no one else can do this it protects your role and position and job ultimately" (F2).

Respondents expressed concern over the 'wellbeing' of team members as a result of cuts: *"you've got the initial people there for the stages but don't forget those people need to get a break at some point throughout the day and have got to get replaced by somebody else" (P12)*, and reduced the overall morale of crews: *"you shouldn't bring politics onto the fire ground you know – and sometimes we see it with our own firefighters. Because if we're dealing with a job and you've got like 6 engines there or 10 engines there, it's all 'remember when we used to have X fire engines?' (F1)*. Commanders commented at how emotionally challenging their jobs are: *"I think in personal life you reflect on things and you think it's a different job more than being a paramedic. You do see things that other people don't see and come across a lot of incidents" (A3)*, yet organisational restraints limited the ability for team members to gain closure on the outcome of incidents: *"a lot of the time the crews are sort of left wondering and I think it's just nice to have that closure. I certainly know I personally feel a lot better knowing even if it's bad news" (F14).*

More specifically related to the role of a commander, respondents expressed anxiety over the capacity of the blue lights services to cope under cuts due to their personal responsibility to cope with austerity: *"I don't know cutting the police service, cutting defence, cutting NHS budgets and all sorts – I guess it's up to us as senior managers to make sure we plan and organise and structure things in such a way that you don't compromise public safety even though you've got far less resources" (P5)*. Respondents felt that their organisations were in turmoil as individuals were having to uptake novel roles that were not in their original job description (e.g. paramedics under ballistic protection): *"although we'd trained them in terms of HART to go into those types of environments were still in a volunteer basis because that's not what they were originally employed to do" (A1)*. Budget cuts and austerity measures thus not only affected decision making at the incident ground, but contributed to general feelings of fear for the future of the blue lights services: *"I don't think austerity's ended. I think we're in this for another 4 years so you know I think it's what happens in the future with our – where do we end up?" (F1).*

5.4.2 Exogenous challenges to emergency incident commanding

5.4.2.1 Communication

In terms of exogenous challenges attributed to team processes, respondents described how communications were a prevalent source of uncertainty at emergency incidents: *“the biggest complaint we have post-incident is communications” (F11); “that’ll come time and time again communications is the biggest bug bear. We never ever seem to get it right” (F5)*. Communication issues were affiliated to insufficient updating from other team members: *“we rely on messages massively and communications and I think it’s a massive failing that we don’t use them because we should” (F4)*, which led to delays in decision making: *“and that delay was to get that relevant advice off the relevant people” (P7)*. The failure to communicate information arose at intra-team levels as crews failed to communicate relevant information to their own commander: *“better communications from the ground would’ve been useful” (P11)*, and at inter-team levels when other agency representatives were unavailable: *“there was no one to liaise with from the other service at all to give me the information that I needed to make a decision” (F4)*; which was especially problematic when coordinating with non-blue lights agencies due to differences in working and organisational cultures: *“and you know by this stage it was 9 or 10 o’clock at night so a lot of the key decision makers in the EA had gone home. So unlike the sort of blue light services where I know that if I need to speak to my chief fire officer at 2 o’clock in the morning I can get on the phone” (F12)*. Insufficient communication was associated with frustration, as efforts to gather information were made impossible: *“people get frustrated because they’re not finding out all the information” (A4); “the most frustrating thing about that was the communications” (F5); “I just found it quite frustrating” (P5)*. It also led to feelings of vulnerability and helplessness as team members were perceived as unreliable: *“I’m still relying on other people to give me information. I am not seeing all and doing all and – so that reliability sometimes it can put a bit of pressure on you” (F7)*.

When information was shared, there were also challenges associated with *miscommunication*. Communications were sometimes ambiguous, and so commanders were uncertain about the meaning of messages: *“the control manager*

rang me and said we've got a major incident – no I think we've got a major incident” (A4), or conflicting, causing commanders to question the validity of information: “I just remember it sticks in my mind it was just the conflict of information... where's that information coming from?” (F4). Miscommunication arose, not only when other team members were speaking to commanders, but also when commanders were providing information and instruction to other team members: “I'll be honest with you at the time I thought I did give fairly clear guidance but clearly actions speak louder than words and the fact that it dragged on so long” (P5). Generally, poor communication of task relevant information induced uncertainty in the team network, creating inaccurate and conflicting assumptions: “it taught us a lesson afterwards that people were making decisions or trying to make decisions who didn't understand what was going on” (A1), that derailed action: “but it was also delayed because we had contrary views. So he was thinking one thing and I'm thinking something else” (P7). This was exacerbated at the multi-agency level, due to poor understandings of one another's language and terminology: “my example that would be if a simple firework through a front door. Now the police would call that – that's a firework through the front door – I might call it an improvised explosive device which has got a completely different response” (F3).

5.4.2.2 Role Understanding

A poor understanding of one another's roles was problematic for the command team. Commonly, commanders felt that *other* agencies were unaware of their *own* agencies' capabilities: “*the level of understanding around capability needs to improve... Capability awareness is a big one*” (F2), and so opportunities to coordinate skills and expertise were missed: “*well the police told us to wait but in reality the police don't know what we've got and what we can do. That became apparent when I speaking to the police and the incident negotiators afterwards*” (F9). A failure to fully understand one another's roles induced unrealistic expectations from other agencies: “*it's easy to manage my own kind of teams and the direction they go and they do what they need to do, it's less easy to manage people's expectations who aren't part of that*” (F8), about what could feasibly be achieved at the incident: “*the fire service were pushing for an evacuation almost before I got there. It was a very challenging area to evacuate*” (P5). In response to poor role understanding, agencies appeared to operate in isolation, focussing on

agency-specific tasks: *“it was that kind of everyone was working extremely hard but there wasn’t necessarily a plan in place. And the clear thing was around what we were doing was everyone was independently chasing the fire in their own way if you like”* (F13), which risked duplication and contradictory efforts: *“there’s people just freelancing in there and doing their own, because you’re actually working against each other in a road traffic collision, because if he’s saying go one way and he’s saying go the other then you’re pulling against each other you know?”* (F4).

Decision making was also derailed when individuals lacked an understanding of their own role: *“I think probably the biggest barriers were the environment agency’s lack of understanding of their own powers.”* (F12). Poor own role understanding was associated with the avoidance of responsibilities: *“I briefed the health protection agency that’s not for me to – I can contribute to the public safety message but it’s not for me as a fire and rescue service commander to release the public safety message. That’s their responsibility”* (F7). For example, it was often (wrongly) assumed that the police would take ultimately responsible for all incidents, and so commanders deferred their responsibilities to the police: *“there’s a tendency from some commanders just to be led by the police”* (A2), which in turn acted to frustrate police commanders: *“it’s not our event. If you’ve got people causing behavioural issues in the cinema who do you speak to? You speak to the people running it. So again there’s boundaries in terms of yes we will assist you but actually it’s your problem”* (P12). Role understanding was affiliated with domain specific experience that increased confidence in decision making authority: *“I think unless you’ve seen quite a few major incidents you might hover about that decision making process”* (A3), and reduced the tendency to acquiesce to social pressures: *“it did teach me a thing about being how easy it would’ve been for somebody else on that day to have succumbed to the pressure to reduce the numbers”* (A1).

5.4.2.3 Trust

A lack of previous experience with team members was associated with poor trust in the abilities of others to perform tasks: *“they weren’t my firefighters so I didn’t know their skills and competencies”* (F8). Likewise, commanders lacked confidence in the abilities of those who they knew, but had had a negative personal experience with: *“I’d worked with him in the past but I got the impression that they*

didn't have at the time when by that afternoon they didn't have as much dynamism and get up and go and knowledge as what I thought they had initially" (P5). Negative personal experiences created trust issues both during the incident: "I wasn't particularly comfortable with the senior officer who was in charge. That sort of gets your hairs up anyway and you think well you know what anyway I might go along to that" (F4), and post-incident: "I don't really know what it was but it was like they'd both had a mutual hatred for each other as a result of that incident. Both thought they were very rude or whatever it was so yeah. But these things happen in crisis don't they I suppose? (P11).

Interestingly, a complete *distrust* in another's abilities did *not* derail decision making, as commanders acknowledged the inapplicability of the trustee's skill set: *"there's a difference between trusting an individual and the expectation that that person at that level will be able to do what I'm asking of them" (F15). Commanders tried to assess their team and make use of their skills in the most appropriate way: "it might've seemed to be quite sexy to get involved in the crux of the incident you know to dress up in these the PPE stuff but there were individuals who were not trained to do that so it was made clear to those responders that their skills were required elsewhere" (A2). Instead, decision making was derailed by mistrust (i.e. uncertainty about whether to trust another): "if I don't have that relationship you know I might be thinking about what he's thinking about doing and is he really interested about what we're doing and so all those things" (A2), as commanders were distracted by questioning the reliability of others rather than focussing on the emergency incident: "he was untested in terms of does he know about health and safety? Does he know about crowd dynamics?" (P2). Mistrust led to suspicion on potential ulterior motives of others: "well sort of quite interested really is to sort of you know, they wanted it to be you know a disaster ok? They wanted to be able to label it and they wanted to be able to give it to us" (F12), and was associated with the fear of being held to account for potentially wrong decisions, that were based on advice from (potentially) unreliable others: "and it was a bit blind leading the blind sometimes to be honest because you were only going from what you were being told" (A4). Mistrust and fear of accountability occurred at intra-agency levels: "on this occasion the book stopped with me. My bronze commanders weren't in a position to actually take the decisions that I wanted them to take. One because I didn't trust them" (P2), and was also*

culturally ingrained at inter-agency levels: *“A great deal of trust but not absolute. I mean they’re very well trained professional people so you know we work well with them and I respect what they do and what they say but I don’t think – you know it’s your I’m the decision maker – it’s my head on the line” (P8).*

Interestingly, a ‘trust paradox’ effect emerged, where *too much* trust in other team members contributed to uncertainty. Respondents were wary of over-familiarisation, as their command decisions may be biased by the opinions of trusted others: *“the danger is there you become too overfriendly or you become unconsciously change your decision making cycle because of someone else’s influence through personality” (P12).* Commanders experienced negative affect and uncertainty if they disagreed with advice from trusted others: *“I trusted him and I think he was an experienced officer and that made me a bit more concerned” (P10),* increasing doubt in one’s own judgement: *“because we got a good working relationship and because he knows what he’s talking about for me to give him an opposing view probably made it slightly more difficult for me because I’m having to think well hang on I trust his decisions” (P7).* Respondents tried to avoid decisions that could cause interpersonal issues with trusted with others: *“he sat on the fence and didn’t – he obviously wasn’t prepared to go up against his colleague and said he was comfortable with both” (F2),* and less experienced commanders may especially struggle with these effects as they are unwilling to break trusted friendships: *“it depends on being prepared to compromise your friendship to make sure the job gets done. So you know I think you’ve got to be to be honest if you’re going to be a commander you’ve got to be prepared to be unpopular – it goes with the territory really” (P11).*

5.4.2.4 Competition

A final exogenous challenge that limited the ability of commanders to effectively respond to emergency incidents was competition within the command environment. At an intra-agency level, commanders described how they sometimes felt pressure from their superiors who competed for control: *“they were ringing the control and trying to put pressure on the control manager to say right we’ll hand over to you and I was like no” (A4).* Competition for control also occurred at inter-agency levels: *“someone will always take the lead. Generally unless someone’s got*

significant objections to that whoever sometimes whoever shouts the loudest gets their own way – in my experience” (F2), especially when trading-off priorities: “biggest barriers initially, is that we all have different priorities” (F9). Competition was exacerbated by a lack of procedural guidance on inter-agency organisational structure: “patient care is always the responsibility of the ambulance service but the extrication is down to us and that can cause some debate at times around clearly everyone’s primary concern and primary emphasis is patient care but there can be some difference of opinion over what the best thing for that particular patient is” (F2), as each agency brings its own, sometimes conflicting, expertise: “there’s also conflict with the ambulance service about the best way to get people out of a vehicle: we think we know best and they think they know best. And it’s hard. It’s being going on for some time that one but we’re getting there” (F4). Indeed, budget cuts and austerity also contributed, as both blue lights and non-blue lights services sought to justify their importance for fear of closure: “upon reflection I understand that – they were losing their jobs and the government want to close all kinds of coastguard stations all around the UK so they were trying to be visible” (F1).

Respondents also described how competitive personalities caused difficulties for decision making: *“you can get a bit of a rub between personalities that command might break down as well” (P1), due to ‘masculine’ and dominant egos: “all very you know power based and lots of boys with their toys and not handing over when they should be handing over. And I get really frustrated” (A4), who were unwilling to share authority: “someone being possessive over this is mine, this is my jurisdiction and I don’t want you coming into it” (F2). Past experience relating to competitive personalities negatively impacted upon interpersonal relationships as others were perceived as having ulterior self-serving motives: “sometimes egos will want to be in charge of the juicy bits but they won’t necessarily want to be involved in some of the other bits and pieces” (A1), avoiding responsibility when there was potential for embarrassment or mistakes: “I think people who are overly ambitious probably shy away from some of the hard decisions” (P4).*

Interestingly, one of the most difficult aspects of commanding emergencies was when commanders had to compete with the desires of their team members to take action: *“you know there’s always a willingness from any probably blue light responder ambulance inclusive that it’s their natural instinct that when I see a*

patient to want to help that patient whereas in a lot of situations it's not always the best thing for their own safety" (A2). Although commanders acknowledged that a proactive approach was useful, they felt that their role as a commander was to protect the safety and moderate the actions of emergency workers: *"we can get in there, we can put it out. Can we get up there?" It was dead keen for all the right reasons but perhaps too gung-ho"* (F11). Commanders expressed anxiety about being unable to control team members and indicated goal-conflict between 'save life' (approach) goals and 'prevent further harm' (avoidance) goals, as explored in Chapter 4: *"tempering the fact that we've got firefighters who are keen and trained and they actually think they're in the business of life saving when actually you've got to sort of stop that and you, you know draw the line between there is no more life-saving"* (F1). Commanders had to compete with their crews due to their responsibility to protect them: *"if you get away with it then great they're heroes, if they don't then they're not coming home"* (F11).

5.5 Discussion

The main challenges to emergency response decision making were themed under two categories to explain different types of uncertainty (Alison et al., 2014). Five *endogenous* challenges emerged, associated with: (i) information problems (too little or too much) (ii) resource limitations (a lack of or unreliable); (iii) time pressure; (iv) social management issues; and (v) budget cuts and austerity measures; and four *exogenous* challenges emerged, associated to team-processing issues regarding: (i) communication (insufficient or miscommunications); (ii) role understanding (both of own role and the role of others); (iii) trust (distrust, mistrust and trust paradox); and (iv) competition within the command environment (Figure 5.1). It is important to acknowledge that the scope of results in this chapter is large, and covers a wide variety of elements that are worthy of further investigation. However, as this chapter was *exploratory* and fundamentally aimed to provide theoretical scope to further the concept of decision inertia in emergency incident settings, a wide discussion of *all* identified contributions to uncertainty was included.

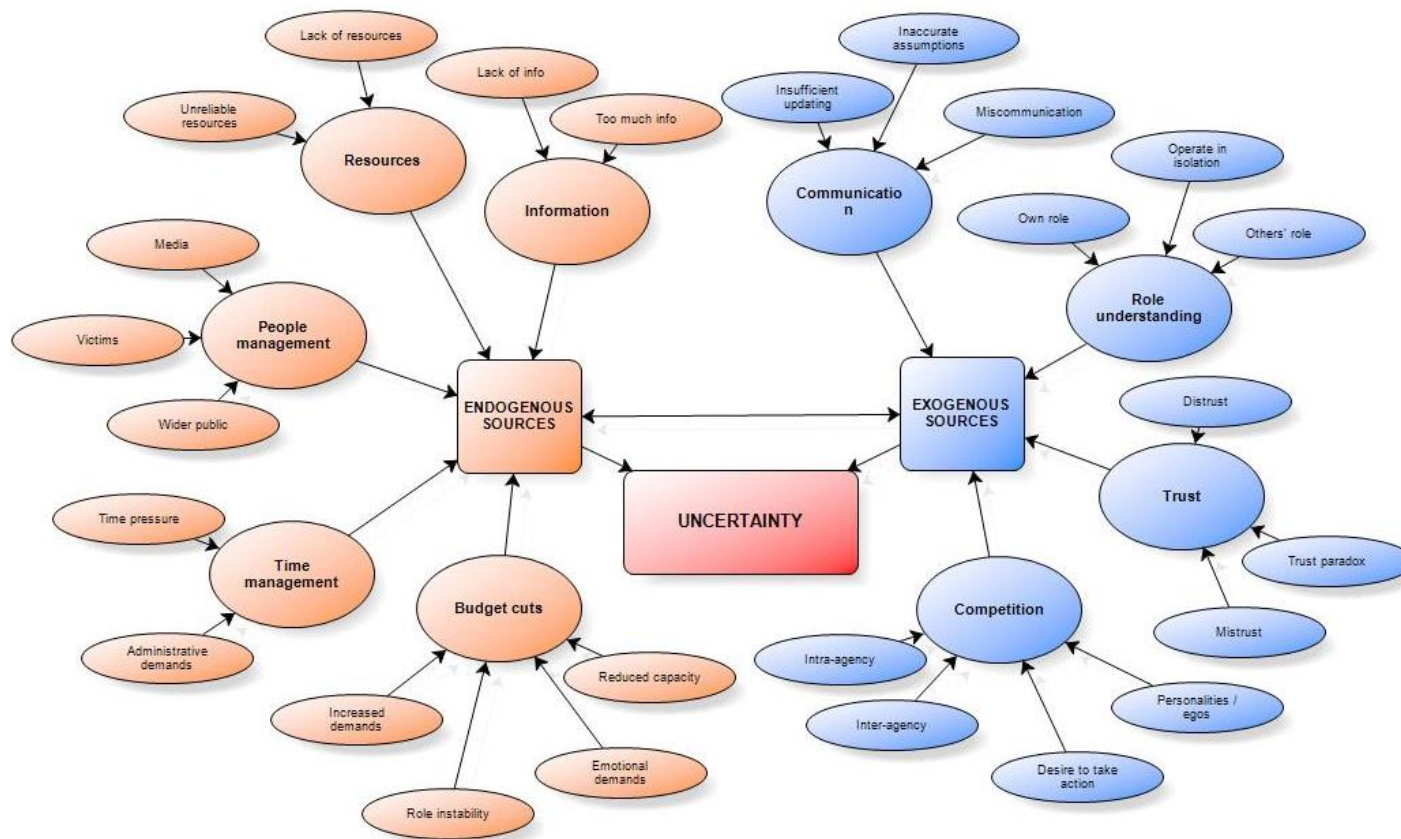


Figure 5.1: The endogenous and exogenous sources of uncertainty experienced by commanders during emergency incident

Although both endogenous and exogenous challenges made decision making more complex, the identification of exogenous challenges associated to the *management* of the emergency incident is more useful for interventions. For example, interventions to improve communication (exogenous challenge) will ease pressures associated with information problems (endogenous challenge). Furthermore, exogenous challenges have been identified as more problematic to decision making than endogenous issues (Alison et al., 2014). Thus, this discussion will now outline the implications of this chapter's findings by firstly discussion endogenous implications followed by exogenous elements.

5.5.1 Endogenous challenges

This chapter has provided qualitative support to previous research that described how emergency incidents are made more complex due to ambiguous information (Bharosa et al., 2010), resource limitations (Miao, Banister & Tang, 2013) and time pressure (Chen et al., 2008). Commanders acknowledged how either too little or too much information could derail choice, which interacted with their reliance on team members. Indeed frustration arose both when there was too little information but also when there was too much. For example, FRS respondents often referred to their 'spans of control', representing an awareness of the negative effects of cognitive overload. Boin and 't Hart (2010) outlined how an 'obsession with full information' was an 'avoidable pathology' that degraded emergency responding. The self-awareness shown by respondents is encouraging as it highlights their willingness to take action with *enough* information as opposed to *all* the information. Furthermore, respondents acknowledged that more novice commanders may lack this skill. Experts are able to effectively adapt to complex environments by using adaptive decision making strategies with an awareness of limitations of their cognitive processing (Kahneman & Klein, 2009). Thus, self-awareness of processing limitations may develop over time with expertise; allowing for faster decision making. A lack of awareness of processing limitations however appeared to degrade decision making, as commanders failed to implement choice; both when they sought more information and when they were cognitively overloaded.

Commanders also described how decision making was challenged due to resource limitations, either because resources were unreliable (e.g. mobile phone

networks not working) or due unavailable, especially with reference to specialist assets (e.g. FRS's 'Search and Rescue Team'; AS's 'Hazardous Area Response Team (HART)'; PS's 'Armed Response Team'). Indeed when the reliability of technological resources drops below 70 per cent, then this can have negative consequences on decision making effectiveness (Wickens & Dixon, 2007). Unreliable resources derail decision making by increasing demands on cognitive capacity and increasing overall uncertainty on whether they should utilise potentially faulty systems. Furthermore, it emerged that resource limitations not only caused frustration in terms of *accessing* resources, but further increased pressure once a commander *possessed* resources associated to having to release resources for other potential incidents. Both resource limitations and time pressure negatively interact with decision making, and have been linked to poor coordination in emergency response management teams (Chen et al., 2008).

Indeed, the experience of time pressure appears to be a resulting feature of many of the endogenous complexities associated with emergency responding, yet it remains a relatively under-researched research area in disaster management research (Janssen et al., 2010). What has been found is that increased time pressure appears to change the way individuals process decisions. For example, police officers who were placed under time pressure adapted to use time efficient satisficing strategies over more prolonged deliberation; thereby generating fewer hypotheses about an investigation (Alison, Doran, Long, Power & Humphrey, 2013). Furthermore, when emergency incident decisions *lack* time pressure with no defined deadline, then this can increase decision inertia in multi-agency teams as individual agencies focus on their own rather than inter-agency goals (Alison, et al., 2015). Findings suggest that time pressure in emergency incidents may thus usefully prompt action and timely decision making. However, as the majority of research within emergency settings to date has been conducted with *experienced* emergency responders (Alison et al., 2013; 2015), there needs to be further investigation on the impact of time pressure on less experienced responders. Furthermore, it would be interesting to investigate *how much* time pressure may be useful before it degrades choice, as time-pressure appears to have a U-shaped effect on decision making by increasing performance prior to degrading it when levels get too high (Baer & Oldham, 2006).

This chapter also revealed two endogenous challenges that were more contextually specific to the current socio-political features of British society: (i) uncertainty relating to ‘people management’; and (ii) the impact of ‘budget cuts and austerity measures’. Both of these challenges reflect changes in the emergency responder role over recent years. Commanders described how it was increasingly difficult to manage the public during emergencies, as they felt under pressure from ‘the gaze of the public’, with crowds often gathering at incidents to ‘film it on their smartphones’ and upload it onto ‘youtube’. Although social media can be advantageous in terms of creating dialogue between the emergency services and the public (e.g. location of public rest centres; Houston, Hawthorne, Perreault, et al., 2015) it can also induce negative effects. For example, it was found during a simulated bioterrorism incident that the public tended to overestimate levels of risk communicated in social media messages from the emergency services and, as a result of their erroneous estimation of risk, became frustrated with the emergency services for not doing enough (Malet & Korbitz, 2015). Indeed, commanders in the current study expressed anxiety about the potential negative public perceptions that may arise due to social media, increasing concerns about accountability. Accountability in emergency settings can impede decision making, as a study found that when police officers felt strongly accountable for their actions in risky choice settings then they tended to focus on egocentric pro-self-goals over collective pro-social-goals (Waring, Alison, Cunningham & Whitfield, 2013). It is possible therefore that public scrutiny may increase decision inertia, as commanders experience goal conflict between ‘save life’ approach goals and ‘prevent further harm’ goals affiliated to negative accountability.

A further contemporary challenge that made decision making more difficult for emergency responders was the negative impact that budget cuts and austerity have had on the ability to respond to emergencies. To put these findings in context, the UK government have drastically cut the budgets for all three blue lights services over the past five years (McCartney, 2015), with a continuation of these cuts expected under the newly elected Conservative Government from 2015-2020. By the end of Parliament in May 2015, the average funding cut for each Fire and Rescue authority was 28%, with a further 10% of cuts planned for 2015/16 (Hammond & Taylor, 2014). A recent survey in London outlined how, despite a 10.9% increase in

emergency calls between April and September in 2013, the London Ambulance Service has experienced a 19% cut in funding, seen the closure of five A&E departments in the area and experienced a threefold increase in paramedics leaving the profession since 2011; an accumulation of pressures that have been used to explain the drastic reduction of ambulances meeting their '8 minute' patient target rate, which reduced from 81% to 48% between March and December 2014 (McCartney, 2015). Furthermore, in the four years leading up to April 2015, the Police have experienced a 23% cut in budgets across forces, which has led to a total loss of 17,000 front line police officers and an average loss to each force of 11% of police officers and up to 22% of policing staff and PCSOs (ACPO, 2015). It emerged from the data that, not only have these cuts altered the fundamental organisational structure of the emergency services, but that commanders are struggling to cope with the consequences of austerity.

Cuts appeared to exacerbate other endogenous challenges, as commanders felt pressure to reduce and free up limited resources, to limit the financial expenditure of operations with regards to maintaining staff on overtime, and to limit the time spent at emergency incidents, which had a negative effect on the ability to provide 'gold standard' interactions with the public as they simply no longer had time. Austerity also had a negative impact on exogenous team processing, as agencies were more competitive with one another as they felt threatened by austerity and team members became frustrated with their need to do more with far less. Commanders expressed anxiety over the future, both for themselves and their organisation, and were concerned about team morale, especially when dealing with emotionally challenging emergency incidents where team members were overworked with little capacity for support networks to exist. Indeed a recent open letter by a Paramedic published by the Guardian newspaper described how cuts in funding have left staff overworked and lacking the emotional and psychological support that they need to operate in such a demanding and important job (Guardian, 2015). This is despite evidence that suggests 'critical incident debriefs' following emotionally challenging incidents are one of the most important requirements to facilitate effective work within hospital settings (Theophilos, Magyar & Babl, 2009), especially with regards to psychological and emotional issues (Ireland, Gilchrist & Maconochie, 2007). Budget cuts have reduced the opportunity to perform debriefs, whilst counterintuitively

increasing their need on an emotional level. The Police Federation have further launched an anti-austerity ‘#cutshaveconsequences’ campaign to highlight the negative impact of cuts, and the Chief Fire Officers Association (CFOA) have published a report outlining the damaging impact that austerity has had on the FRS (CFOA, 2012). The negative impact of budget cuts and austerity was one of the largest and most commonly discussed themes across all three blue lights services, and presented a massive challenge to emergency responding.

5.5.2 Exogenous challenges

Commanders discussed a number of challenging features of the incident that related to social and team processing. Poor communication was a key feature as decision making was made more difficult when team members failed to provide relevant information, at both intra- and inter-team levels. Importantly, poor *communication* is distinct from issues associated with *information* as it specifically refers to *how* information is shared throughout the *team* environment. Indeed, sub-teams in multi-agency environments tend to focus on communicating information to facilitate intra-agency goals rather than wider-team goals (Bharosa et al., 2010), and inter-agency communication in multi-agency emergencies tends to reduce when decision complexity is increased, leading to decision inertia (Alison et al., 2015). The *miscommunication* of information was found to be an issue in the present study. Miscommunication was associated to inaccurate assumptions between team members as they either misinterpreted or did not understand communications with other team members. The risk of assumptions based on poor communication is especially problematic in strategic teams, as individuals are often reluctant to highlight uncertainty due to fear of negative reactions from others in the strategic team (Bang, 2012). The risk of miscommunication is increased in the emergency services as they use specialised terminology and agency-specific acronyms in their communications (Laakso, 2013); that may be specific to agencies, specialist teams within agencies and further regionally influenced across the country and abroad.

Poor role understanding also created problems for emergency responders. Having an understanding of one’s own and others’ roles within both single- and multi-team environments is beneficial for team processing (Cannon-Bowers et al., 1995; Mathieu et al., 2001). Yet when role understanding is poor, then it has a

negative impact for team members who tend to reduce information sharing and communication (Weller et al., 2008). Poor role understanding in the present study was often related to inefficient team processing and frustration between team members. Indeed commanders expressed how other agencies were often unaware of the capabilities they could offer and this led to feelings of helplessness and a desire to operate in isolation. A poor understanding of other agency capabilities may diminish the opportunity for lateral thinking when faced with novel and unanticipated events; something that has been identified as useful for multi-agency coordination (Curnin et al., 2015). For example, a police commander taking primacy at the scene of a novel bridge collapse may not consider innovative solutions involving rescues from height as they are unaware of this FRS capability.

Agencies were not only unaware of *other* agency roles and responsibilities, but they were also at times unaware of their *own* roles and responsibilities. This is problematic for decision making as a lack of confidence in one's own capabilities is associated with 'amotivation' and an increase in avoidant goals (Lee, Sheldon & Turban, 2003). This was especially problematic when commanders were operating with non-blue lights responders (e.g. local authorities, environment agency). Commanders showed frustration that non-blue lights agencies tried to avoid their own responsibilities when there was a blue-lights presence. This appeared to be due to a cultural mismatch between organisations where, for example, non-blue lights authorities operated on a nine am to five pm rota and thus were reluctant or unavailable to operate outside of these hours. Indeed, a study exploring international (non-blue light) organisations responding to complex emergency incidents and disasters identified that inconsistent organisational structures created difficulties for coordination; specifically as non-blue lights authorities were characterised by *centralised* decision making structures, meaning that those 'in the field' had little decision making authority (Kruke & Olsen, 2012). This differs to the organisational structure of the emergency services, which often devolves a large proportion of decision making authority to those on the ground (e.g. tactical commanders). This is an area for potential future investigation, as there appears to be limited research exploring the understanding of non-blue lights authorities with regards to their roles during emergencies.

Related to poor role understanding was the issue of poor trust in emergency decision making. Teams in emergency environments are often temporary and rapidly formed. Temporary teams rely heavily on the formation of 'swift trust', which is contingent upon a clear understanding of roles (Curnin et al., 2015; Meyerson et al., 1996). Cognitive trust in a team member's abilities has a greater effect on task outcome than emotional trust based on interpersonal experience (Parayitam & Dooley, 2008). This pragmatic approach to trust related to an objective awareness of roles and abilities was highlighted by commanders when working with unknown others. Interestingly, distrust (i.e. opinion that another *cannot* be relied upon) did *not* appear to derail choice; commanders acknowledged the other individual's lack of skills and adapted their decision making in accordance to this (e.g. ask someone else). Instead, most negative effects arose from *mistrust* of another in their command team whereby they were *uncertain* about whether they could rely on another. Indeed the experiences of trust and perceived risk are suggested to be 'mirror images' to one another and closely tied with feelings of uncertainty (Das & Teng, 2004). Perceived risk increases when one is *uncertain* about whether they can trust another; whereas certain knowledge on the poor abilities of another can be adapted to. Similarly, with regards to the exogenous challenge of communication, it appeared that *uncertain* communications causes the greatest problems for decision makers. Indeed, uncertainty contributes to decision inertia, as individuals are distracted with weighing up the trustworthiness or reliability of information, rather than focussing on the objective outcomes of the emergency incident.

A unique finding of this chapter that also relates to trust was what was termed the 'trust paradox'. Commanders described how high levels of trust in other team members sometimes made decision making *more* challenging. This was because disagreements with trusted others led to anxiety and uncertainty over whether to trust one's own judgement, or that of the trusted other. This appeared to be due to conflict with emotional trust (Parayitam & Dooley, 2008), as commanders had a trusted interpersonal relationship with the other team member. The conflict between holding emotional trust whilst doubting the abilities of a team member created uncertainty over whether they could be trust their advice. Thorgren and Wincent (2011) outlined how trusted inter-organisational relationships can have a *negative* effect of performances as firms develop rigidities leading to organisational *inertia*. High

levels of trust are associated with reduced social monitoring as team members have faith in others to perform their roles effectively (Mayer, Davis & Shoorman, 1995); often perceived as positive team processing (Marks et al., 2001). Yet this form of unquestioning trust when operating in emergency incident settings may be undesirable due to the inherent risk, complexity and potential for error (Alison & Crego, 2007; Orasanu & Connolly, 1993), which may instead benefit from social monitoring. Indeed, JESIP's introduction of the 'Joint Decision Model' (an adaptation of the Police 'National Decision-making Model') encourages commanders to constantly review and reassess their available information during decision making within joint command team settings. It is possible that these recommendations could contribute to inertia, as trusted team members waste time democratically deliberating over whose advice or opinion is most valid rather than focussing on the emergency task.

A final exogenous challenge to emergency incident response related to competition between agencies, which occurred at both intra- and inter-team levels. At the intra-team level, commanders described how they felt tension between their responsibility as a commander (to protect team members from harm) and the desires of their subordinate team members to take action to 'save life'. For example, a paramedic commander described the conflict between the desire for his team members to treat patients, and his desire as a commander to ensure the paramedics themselves aren't exposed to unnecessary risk. Mamhidir, Kihlgren and Sorlie (2007) surveyed the qualitative experience of strategic healthcare workers who described how, when faced with tough ethical decision, strategic responsibilities increased feelings of isolation and exposure from team members, making decision making more difficult. Strategic decision makers experienced conflicting and competing feelings between their professional and personal beliefs (Mamhidir et al., 2007); which was echoed in the current findings as commanders empathised and supported their team's desire to take action, yet were aware of their competing responsibility as a commander to prevent harm to emergency service workers. As described in Chapter 4, this is associated to goal conflict and decision inertia.

Commanders also described intra-team competition for control with superiors in their own organisation. The UK emergency service command structure is hierarchical, whereby responsibility is passed up the command chain when an

incident escalates. This led to commanders sometimes feeling pressured to ‘hand over’ responsibilities to their bosses. Within-team competition can be beneficial to decision making as it encourages team members to work harder (Crawford & LePine, 2012), yet the time criticality of emergency incidents may reduce these positive effects as there is little time for disagreement and discussion. He, Baruch and Lin (2014) distinguished between adaptive *development* competition that focusses on collective outcomes of the team, and team *hypercompetition* that refers to the desire of a team member to outperform other team members with little consideration for collective team goals. Team development competition was adaptive and associated with feelings of collectivism and team empowerment whereas hypercompetition created negative team processes (He et al., 2014). Thus, superiors who seek to take control may benefit from self-monitoring systems to identify *why* they believe they should take command – either due to motivations for team development or personal gain. Likewise, open discussion between commanders on the reasons for *why* an incident was ‘handed over’ may reduce any potential negative side effects associated with poor personal relationships.

Competition for control was also experienced *between* agencies, especially when there was a lack of procedural guidance to identify who should take ‘primacy’ (main control of the incident). Poor role understanding (as a result of poor strategic direction) can cause agencies to focus on familiar intra-agency priorities over collective goals (Alison et al., 2015; Banks & Millward, 2007). Effective multi-team environments are characterised by coordinated action that transforms intra-agency goals into collaborative inter-team action (Marks, et al., 2001; Mathieu, et al., 2000; Millward et al., 2010), yet, as found in Chapter 4, although agencies may share common collective goals (i.e. ‘save life’) this can compete with intra-agency specific goals (e.g. ‘maintain normality’). It is possible that although agencies may understand other agencies’ roles during the critical incident, that they lack an understanding of additional pressures associated with their subtle role-specific responsibilities. Furthermore, when organisations engage in increase inter-agency work, then this can increase confusion and competition as professional boundaries become more blurred (Brown et al., 2000). This raises an important question with regards to the ethos of JESIP as although collaborative work can theoretically facilitate collective goals, it also has the potential to increase hypercompetition for

agency-specific goals. There is a risk that the professional boundaries between agencies may blur, inducing an increased focus on intra-agency goals (Alison et al., 2015; He et al., 2014). This may further negatively interact with budget cuts and austerity measures as agencies compete with one another to justify their integral worth at emergencies as evidence to prevent further funding cuts.

5.6 Conclusion

This chapter has identified nine key challenges to command level decision making in emergency incident settings. It dichotomised findings in line with the endogenous-exogenous taxonomy (Alison et al., 2015), where endogenous challenges included: (i) a lack of, ambiguous or too much information; (ii) unreliable or unavailable resources; (iii) time pressure; (iv) people management; and (v) adapting to and coping with budget cuts and austerity; and exogenous challenges included: (i) communication problems regarding insufficient updating and miscommunication; (ii) poor role understanding of other agencies, both in terms of being unaware of their own obligations and holding erroneous and inaccurate assumptions about other agencies' responsibilities; (iii) trust issues associated with distrust, mistrust and the paradox of trust; and finally (iv) competitiveness within the command environment as a product of competing and conflicting goals. Importantly, it emerged that both endogenous and exogenous features of the incident interacted with one another. Endogenous challenges associated with the emergency incident environment (i.e. time pressure) could negatively impact upon exogenous features (i.e. role understanding), increasing overall uncertainty. However, a key implication is that this interactive relationship may be usefully reversed to increase the resilience of exogenous features to reduce uncertainty associated with (uncontrollable) endogenous influences. Indeed, improvements in communication, role understanding, trust and reduced competitiveness could reduce the negative impact associated with endogenous features. Thus, it is important to identify endogenous and exogenous pressures in order to inform potential interventions.

Chapter 6: The influence of goal-setting on decision inertia: How inconsistent inter-agency goals and the inappropriate application of collective ‘approach’ goals can degrade decision making at emergency incidents

6.1 Abstract

This chapter sought to explore how self-reported goals interacted with decision making behaviour during a simulated multi-agency emergency incident. Specifically to identify: (i) whether inter-agency goals were consistent; and (ii) how different types of goals interacted with the time taken to make decisions. A total of n=50 command-level decision makers from the Police Services (PS), Fire and Rescue Services (FRS) and Ambulance Service (AS) were split into n=13 multi-agency teams, ranging in size from three to five members. Each team participated in a simulated emergency incident about a ‘terrorist’ attack (using ‘Hydra’ technology; Alison, van den Heuvel, Waring, Power, Long, O’Hara & Crego, 2013). Teams received nine feeds (i.e. visual / textual / audio) of information about the incident, along with iterative and dynamic updates upon request. Data was collected using electronically time-stamped ‘decision logs’ and questionnaires following the exercise. It emerged that participants from different agencies prioritised different approach or avoidance goals: PS participants showed consistent goal conflict between approach and avoidance goals; FRS participants initially prioritised avoidance goals but then increased approach orientations; and the AS were consistently approach oriented. Yet, participants inaccurately perceived inter-agency goals to be consistent indicating that: (i) participants’ goals align with intra-agency, role-specific demands; and (ii) commanders are relatively unaware of the nuanced differences between their goals. At a multi-agency team level, it emerged that teams who predominantly held *approach* goals were significantly faster at decision logging early in the incident; yet became significantly *slower* later on in the incident. This is suggested to be due to functional inconsistency of the use of approach goals in complex extreme environments. Implications for the usefulness of approach goals during complex decision making are discussed.

6.2 Introduction

This thesis has so far provided a rich and detailed description of the challenges to decision making that were identified from qualitative interviews with emergency

response commanders. With regards to goal-directed choice, it has been identified how goal conflict can contribute to decision inertia due to competition between approach and avoidance goals. This was due to anticipated consequences associated with causing potential harm through both action and inaction. It was important to explore these effects in more controlled settings to triangulate the data. This chapter will:

- (i) Outline the literature on the positive and negative effects of goal-setting.
- (ii) Identify two hypotheses, derived from both the literature and qualitative findings:
 - a. Hypothesis 1 (H1): Self-reported goals between agencies will be consistent.
 - b. Hypothesis 2 (H2): Holding approach goals will increase decision making speed and reduce overall decision inertia.
- (iii) Present this chapter's findings on the interaction between goals and decision making during an immersive simulated 'terrorist' multi-agency incident.
- (iv) Discuss the implications of findings with regards to recommendations to:
 - a. Improve inter-agency awareness of role-specific goals.
 - b. Ensure that 'approach' goals are appropriately used in extreme environments.

6.2.1 Goal-directed choice

Decision making in organisational settings is driven by goals (Yates, 2003). Goals act as motivational markers that direct human behaviour towards purposeful outcomes (Locke & Latham, 1990). When faced with a task, goals serve as the upper-level, overall strategic aim that the decision maker hopes to achieve. In order for goals to be effective, it is important that they are *specific* rather than abstract or vague (Locke & Latham, 1990) as a lack of clear team goals is associated with team processing failures (Hackman, 2002). Goals in emergency-response settings are outlined both at intra-agency levels (i.e. specific to each agency) and at inter-agency level, with the identification of collective goals to 'save life' and 'reduce harm' (JESIP, 2013). Theoretically, the identification of these goals should *facilitate* decision making by providing a goal-directed purpose to emergency response

behaviour. However, as identified earlier in this thesis, goals may at times conflict with one another, inducing decision inertia. It is important to identify the different types of goals used by emergency responders in order to identify whether goal-setting in its current form is adaptive to choice implementation.

In terms of the psychological interaction between goal-setting and behaviour, Ajzen's (1991) Theory of Planned Behaviour describes how the likelihood of achieving a given goal is related to an individual's *intentions*. Intentions result from an individual's perceived level of behavioural control over the situation, their positive or negative attitudes towards the goal-directed behaviour and the subjective norms relating to social pressure to perform certain behaviour (Ajzen, 1991). In emergency response settings, this would mean that commanders must feel in control of the situation, have a positive attitude towards taking action and feel support from other team members in order to hold high *intentions* to take action. However, as identified previously, goal consistency between team members was not always apparent. Furthermore, the complex nature of the emergency incident may decrease feelings of control over the situation (Chen et al., 2008). This could threaten the *intentions* of commanders to commit to goal-directed actions; thereby increasing the risk of decision inertia.

It has been suggested *goal* intentions alone are not enough to induce behaviour. Individuals must also have clear *implementation* intentions to translate goal-directed ideals into behavioural action (Gollwitzer, 1993; 1999). Implementation intentions refer to the intended tactical behaviour an individual seeks to perform in response to situational characteristics (i.e. 'if situation Y happens, I will do X') and thus helps one to achieve their strategic goal. As identified in Chapter 4, uncertainty about options (i.e. implementation intentions) derailed choice in approach oriented commanders as they failed to understand *how* to translate goals into action. Having clear implementation intentions has a significant positive effect on goal attainment (Gollwitzer & Sheeran, 2006). For example, a paramedic may hold a strategic goal intention to 'save life', yet their implementation intentions can differ depending on the time criticality of the patient. If the casualty is in a critical condition, they may take more risky but faster actions; whereas when the patient is more stable, they are able to perform slower yet safer procedures. The possession of implementation intentions thus links to expertise, as experts possess a wealth of implementation

intentions to rapidly, and intuitively, perform a given (goal-directed) behaviour in response to a given stimulus (Klein, 1998). Thus, expert performance is based upon a culmination of clear goal intentions (e.g. save life) coupled with multiple goal-relevant implementation intentions (i.e. tactics). This suggests that the identification of *strategic* goals is not enough to facilitate goal-directed *behaviour*. Commanders must also hold implementation intentions, which represent the *tactical* options to increase overall goal attainment. Indeed this may be problematic in the emergency response domain whereby incidents are often novel and ambiguous, as the ability to activate goal-relevant implementation intentions is reduced.

6.2.2 The negative effects of poor goal-setting

Although goal-setting can have a positive impact on decision making by focussing behaviour on strategic objectives, goals can also *degrade* decision making if they are misapplied. Indeed, ambiguous or abstract goals (e.g. ‘do your best’) can decrease decision making performance (Locke & Latham, 1990; 2002). This would suggest that approach goals, which are typically associated with achieving positive behaviour and action (Elliot, 2006), may degrade choice if they are ambiguous. This raises an important point on whether ‘save life’ goals facilitate emergency responding or not, depending on how ‘abstract’ they are perceived to be. Goals must avoid being too ‘easy’ and should offer some kind of challenge for action, as easy goals can negatively impede action as they are associated with minimal emotional intent to take effortful action (Locke & Latham, 2006). Alternatively, overtly *specific* goals can degrade choice if the problem environment is complex as decision makers experience cognitive overload and excessive stress (Drach-Zahavy & Erez, 1997). Specific goals can also distract decision makers from alternative options leading to ‘tunnel vision’, focussing only on goal-relevant information and excluding other important factors (Drach-Zahavy & Somech, 1999). Indeed, in complex situations emergency responders have been found to focus on intra- rather than inter-team goals, which increased decision inertia (Alison et al., 2015). This suggests that, although goal-setting can facilitate decision making (Locke & Latham, 1990; 2006), if goals are inappropriately used, either by being too abstract and simple or too specific and complex, then decision making performance degrades.

A further contextual element to decision making that may moderate the usefulness of goal setting is when decisions are made in *team*-based environments. Indeed, the Theory of Planned Behaviour outlines how subjective norms relating to *social pressure* to perform certain types of behaviour can influence a decision maker's intention to achieve a goal (Ajzen, 1991). Individuals may avoid taking action to progress towards goals if they feel that the rest of their team do not support and/or oppose the goal. Goal-setting in teams adds a further layer of complexity to the likelihood of goal accomplishment (Locke & Latham, 2006), not only due to the potential negative effect of conflicting inter-team goals, but due to the potential for disparity between one's personal goals and the groups' collective goals (Seijts & Latham, 2000). The desire to achieve a goal in organisational and team-based settings is associated with one's perceived level of involvement with goal setting (Yearta, Maitlis & Briner, 1995). This means that team members must feel committed and supportive of goals. Feelings of 'psychological ownership' (Edmondson, 1999) over goals can facilitate goal accomplishment and so individual team members must feel invested and involved in goal setting. This is relevant to decision making in emergency contexts, whereby commanders from multiple agencies must coordinate their intra-agency goals into collaborative inter-agency action (Marks et al., 2001; Mathieu et al., 2000; Millward et al., 2010). If team members do not feel committed to team goals, they will have smaller intentions to invest behavioural effort to achieve the goal (Ajzen, 1991) and thus decision making derails. Indeed, a lack of commitment to collective goals may be especially problematic in complex decision domains where 'hyper-competition' between sub-teams means that individuals favour intra-agency objectives (Brown et al., 2000; He et al., 2014). As competition between agencies was identified in this thesis to be an exogenous factor in decision making, it is important to explore the level of consistency between different agency's goals and how this interacts with team processing. This chapter will therefore use the simulation to identify the different types of goals that were identified by commanders from different organisations, to examine their positive or negative effects on choice implementation.

6.2.3 Summary

Although goal-setting predominantly facilitates decision making, it appears that when operating in complex, team-based environments that goal-setting may be

misapplied. This is due to issues associated with cognitive, affective and social processing, which may reduce an individual's *intention* to achieve a given goal. It has been identified in this thesis that when multiple goals conflict with one another, either psychologically or at the team-level, then this increases redundant deliberation and decision inertia. It is therefore important that goal-setting in emergency response environments is both appropriate and useful. Indeed, the JESIP 'Joint Doctrine' identifies two goals for emergency responders: to 'save life' and 'reduce harm' (JESIP Joint Doctrine, 2013). It is important to explore: (i) if these goals are actually *used* by emergency commander's according to their self-reported goals; and (ii) whether these goals are *useful* in terms of facilitating behaviour. This chapter sought to explore the relationship between self-reported goals and behaviour in a simulated multi-agency emergency environment. Specifically, it sought to identify evidence relating to two hypotheses:

- *H1: Self-reported goals between agencies will be consistent*
- *H2: Holding approach goals will increase decision making speed and reduce overall decision inertia*

6.3 Method

Data was collected from an Immersive Simulated Learning Environment (ISLE) to explore the real-time decision making of emergency responders operating in a simulated multi-agency environment (*see* Alison, van den Heuvel, Waring, Power, Long, O'Hara & Crego, 2013). The study was conducted using 'Hydra' software, a computer based ISLE where participants are provided with audio, video and textual information about an unfolding decision making event (i.e. emergency incident). Information is fed to participants in real-time and dynamically changes in relation to the decisions made by delegates. Delegates are asked to log their decisions in an electronic 'decision log', which is visible to the facilitators of the exercise in the control room, who may then adapt the flow of the unfolding incident accordingly. Although 'Hydra' is traditionally used for *training* decision making in complex and high-stakes environments, it was adapted in this study to facilitate data collection. Importantly, the simulation was designed in close collaboration with subject matter experts (SME) from each of the three blue lights agencies in order to provide training benefit to the delegates who participated. This was why a 'Marauding Terrorist

Firearms Attack' (MTFA) incident was used, as this complemented recent classroom training they had received on 'joint decision making' in line with the JESIP initiative.

6.3.1 Participants

A total of n=50 participants took part in the study, who were split into 13 multi-agency groups. Participants were representatives from the Police Service (PS; n=17), Fire and Rescue Service (FRS; n=22) and Ambulance Service (AS; n=11) and were qualified incident commanders. The majority of participants were male (n=46) and aged between 41-50 years (n=37). All participants were experienced, with their length of service ranging from eight to 35 years, with a mean of 24.03 years. There were 13 groups, meaning that the simulation ran a total of 13 times, with between three and five participants in each group. The aim was to have at least one representative from each agency present during each simulation; however, occasionally representatives who had agreed to participate became unavailable last minute as they had to respond to an unanticipated real-life incident. Thus, at times, only two out of the three agencies had a representative present in the simulation. This is an acknowledged but anticipated limitation due to the nature of the participants' job. When an agency representative was absent during the simulation, SMEs in the control room provided the group with information about decisions on behalf of the absent agency. Table 6.1 outlines the participant details for each group.

Table 6.1: Number of participants from each agency and totals for each group

Group	Number of participants			Total
	Police	Fire and Rescue	Ambulance Service	
1	2	2	1	5
2	1	1	1	3
3	2	2	0	4
4	1	2	1	4
5	1	1	1	3
6	1	2	1	4
7	0	2	1	3
8	2	2	1	5
9	1	1	1	3
10	2	2	1	5
11	1	1	1	3
12	2	2	1	5
13	1	2	0	3
Total	17	22	11	50

6.3.2 ISLEs for research: Hydra

Hydra is an ISLE that has been used extensively to train practitioners in high-stakes decision making in a variety of domains including major incident management, child protection and national security (Hydra Foundation, 2015). It is typically used as an organisational training tool, allowing ‘trainees’ to role play challenging decision making in an immersive and realistic, yet simulated and safe, environment. Hydra can train various skills, ranging from work-domain specific incidents (e.g. major incident response) to more general skills relating to organisational and team management (e.g. human resources issues). Importantly, not only can Hydra facilitate practitioner training, but it creates a data rich environment from which it is possible to conduct research (Alison, et al., 2013). For example, by analysing the data that is digitally recorded during the simulation (e.g. decision logs, audio recordings). Hydra has previously been used for research by collecting secondary data from training events. The study in this chapter was unique, using Hydra as a platform through which a simulation was developed in order to facilitate *both* research and training needs, designing the simulation from the ground-up through close collaboration with SMEs. As such, a brief overview of the use of simulations for research will be outlined below, grounded in examples using the Hydra system.

6.3.2.1 Using Hydra as a simulation platform for NDM research

Simulations offer a fruitful method for collecting NDM data in high fidelity environments, which also allow for experimental control. The general process when running a simulation involves two teams of people: (i) the *delegates*, who are participating in the simulation as decision makers; and (ii) the *facilitators*, who are located in an external control room and oversee the simulation. In the case of Hydra, delegates are placed inside a ‘syndicate room’ (Figure 6.1), where they receive audio, visual or textual information relating to the simulation. Hydra is a team-based simulation and so groups can be intra-agency (e.g. all PS) or multi-agency as was the case in this thesis (i.e. PS, FRS & AS). Unlike virtual reality simulations, which use headsets and haptic sensors to create visually immersive environments, Hydra delegates are provided with information via audio, video and textual messages that are transmitted over a large projected screen (Figure 6.1). The focus is on creating a

psychologically immersive decision making environment, rather than focussing on a *visually* immersive environment. Depending upon the nature of the exercise, delegates may also be provided with additional real-world tools in the syndicate room such as maps and laptop computers. Delegates interact with the simulation by using a computer, where they are able to access their ‘decision log’ (to log actions) and ‘communicator’ (to ask for further information/questions from the control room). A unique feature of Hydra is that facilitators in the control room can adapt the information they feed into the simulation depending upon the actions that have been logged by the delegates. For example, in hypothetical Police investigative scenario, one team may choose to interview a suspect whereas the other team (in a separate syndicate room) decides to wait and gather more intelligence. Facilitators can adapt information feeds according to this by, for example, sending a video feed of an interview with the suspect to the first team, and providing an update about the location of a second suspect to the second team.



Figure 6.1: A typical Hydra ‘syndicate room’

The facilitator team in a Hydra simulation, which may include SMEs, trainers and researchers, are located in the ‘control room’ (Figure 6.2). This room contains a numerous computer screens that are used to monitor the behaviour in the syndicate room. As demonstrated in Figure 6.2, it is possible to run multiple syndicate rooms at once depending upon the objectives of the exercise. Facilitators have responsibility for ‘firing’ information into the syndicate room via the computer.

Generally, a ‘timeline’ is used to guide this process (Table 6.2), which roughly outlines the narrative order of injects, although this can change in response to the decisions made by the delegates. The live monitoring of delegates in the room, via CCTV and audio, helps improve the realism of the exercise, as information feeds can be prepared in advance of delegates submitting their decisions on the log and new challenges can be created ‘in vivo’ based on the team’s performance. For example, in the current study, the AS SME felt that AS delegates could be challenged more than they were. Thus, a new information feed was prepared ‘in vivo’ to ask the AS delegate about their ‘patient extrication method’ (i.e. how they were going to treat casualties). When delegates have completed their Hydra simulation, a ‘debrief’ is usually held. This is when SMEs dissect the decision making of the delegates in an open, informal setting.



Figure 6.2: A typical Hydra ‘control room’

6.3.3 Procedure

As the researcher for this thesis helped to design the simulation used for data collection, a detailed description of the collaborative procedure that was used to design, develop and run the simulation for this thesis will now be outlined. Specifically, this process involved five steps: (i) identifying objectives for the

exercise; (ii) designing the timeline; (iii) recording and building the scenario; (iv) recruiting participants; and (v) running the simulation.

6.3.3.1 Step one: Identifying key objectives

During the initial design of a simulation to be used for training and / or research it is important to identify key objectives to help guide the process. As mentioned previously, data for this chapter was gathered from a Hydra simulation that was uniquely designed to meet both research and training needs. This was a result of the mutually agreed knowledge-exchange arrangement between the University of Liverpool and the local emergency service authorities. Specifically, the emergency services will allow for research and data to be collected during their training in exchange for feedback and help in designing scenarios for their training exercises. For this study, research goals were to explore *command-level* decision making in a *multi-agency* team environment where it would be possible to unpack choices via the use of decision logs and post-simulation questionnaires. It was important to try and replicate the incident across groups in order to allow for comparison of effects between groups and so the timeline required a linear structure, albeit with the potential for additional information when required. Training goals were to create a real-world simulation to ground previous classroom training on the JESIP interoperability programme. Commanders from all three agencies had recently attended a one day training course (which was run on different days over a number of months) that aimed to align command decision making with the government's JESIP initiative. Furthermore, there were ongoing discussions, external to this study, about running a *live play* multi-agency exercise of a 'Marauding Terrorism Fire Arms' (MTFA) incident (a moving terrorist attacking civilians with a firearm) and so the simulation offered a cost-effective platform to trial elements of the exercise. The MTFA scenario further fit the training requirements of JESIP, as there is no clear authority (or agency 'primacy') with regards to many of the decisions that would need to be made (e.g. whether to commit staff into risk area).

6.3.3.2 Step two: Designing a scenario timeline

Once key objectives and the scenario topic had been agreed upon, it is possible to start building the timeline for the exercise. This process involved a series of emails and face to face meetings between SMEs and the researcher to discuss

different ideas on how the incident may unfold. The researcher drew up an initial timeline that was sent to the SMEs. It described an MTFA incident involving three gunmen who had opened fire at a busy, city centre national railway station at peak hours (i.e. 8am). Additional details and injects of information were added to this initial timeline during brainstorming and then piloted in slow-time with external SMEs. The SME comments helped to provide clarity to the incident prior to the formal recording of audio materials.

The scenario timeline for this study is outlined in Table 6.2. Two key injects were inserted to challenge decision making. Firstly, the ‘zoning task’ (inject 2) asked commanders to make a joint decision on where to place the ‘hot’, ‘warm’ and ‘cold’ zones. This is a procedure used by the emergency services for identifying risk during an ongoing incident. For a terrorist incident, the ‘hot’ zone is the area in which the gunmen are operating and the only emergency service responders allowed in this zone are trained, armed-response-team police officers. The ‘warm’ zone is the area that the gunmen have either already been or have the potential to (re)enter, where only specialist trained emergency workers from the three services may operate due to the inherent risk. This means that staff numbers are limited and civilians within the warm zone must be evacuated immediately in order to receive treatment. Finally, the cold zone is the area outside the incident where there is little or no risk for the gunmen to appear. As such casualty triage centres are usually located here. Inject 2 asked delegates to make a joint decision on how to identify these zones in order to enable effective and safe working strategies for their teams, as would be expected in a real-life incident.

The second key inject in the scenario was the ‘non-specialist staff at RVP’ decision (inject 7). By this point of the exercise, resources were depleted (especially due to an additional fire inside the train station) and civilians were still bleeding and dying on the concourse (which by now should have been re-zoned as a ‘warm’ zone as the terrorists had moved to the underground). Delegates had to decide whether to break protocol and allow non-specialist staff (who had lifesaving skills but lacked specialist training and appropriate personal protective equipment (PPE) for firearms) to operate on a voluntary basis in the area to help with casualty rescue and treatment; or whether to refuse them access this area in order to protect emergency workers and continue to operate with stretched resources whilst casualties worsened and fatalities

grew. As this was a ‘wicked problem’ with no right or wrong answer, the delegates received an angry message from the FRS Chief whatever their decision (inject 8a/b). This was to then prompt them to justify their decision and reflect on their rationale at the end of the simulation.

Table 6.2. Simulation timeline

Inject	Title	Message source	Details
1	Initial callout message	Control centre – Phone call (AUDIO)	Multiple 999 calls being received. Reports of 3 men on Station platform who have opened fire with automatic weapons at civilians on platform. Rush hour trains.
2	Zoning task	Communicator (TEXTUAL)	Delegates told they are now at the RVP. They have been provided with maps and must decide upon hot/warm/cold zones and place their FCP.
3	Civilian message	Civilian – live message (AUDIO)	Frantic message from a civilian who was inside the station. Informs of a large number of casualties bleeding out and that shooters are still firing at civilians.
4	Casualty update	Control centre – Phone call (AUDIO)	Multiple 999 calls being received. Same as civilian information – people bleeding and dying and gunmen still firing.
5	Shooters to underground	Control centre – Phone call (AUDIO)	Report from Firearms Officers that shooters have moved down into the underground local lines of the train station.
6	Fire inside station	Control centre – Phone call (AUDIO)	Reports that a fire has started in a bar inside the train station with persons trapped. Fire resources are stretched.
7	Non-specialist staff at RVP	Firefighter – Radio message (AUDIO)	Addition staff from FRS and AS arrived at RVP. They are <i>not</i> trained to work in firearms incident but are volunteering to commit. Delegates must decide whether to use them or not.
8a	Angry chief – Commit	FRS Chief – Phone call (AUDIO)	If decide to <i>commit</i> – FRS Chief rings demanding to know why non-specialist staff have been committed into the risk area.
8b	Angry chief – Not committed	FRS Chief – Phone call (AUDIO)	If decide to <i>not commit</i> – FRS Chief rings demanding to know why non-specialist staff have been committed to the risk area.
9	TCG update	Police officer – Phone call (AUDIO)	A situational update message must be sent to the strategic multi-agency team

Note: RVP = Rendezvous Point; FCP = Forward Command Point; TCG=Tactical

Coordinating Group

6.3.3.3 Step three: Recording and building a simulation

Once a timeline had been developed, it was possible to begin building the simulation by collecting materials and coding in the Hydra computer system. The simulation materials for this study were collected by the primary researcher and predominantly involved audio feeds (see Table 6.2). A script was produced, with assistance from SMEs, that was given to ‘actors’ who were encouraged to use the script as a guide and to add any additional terminology if they saw fit (Appendix Five). Whenever possible, audio recordings of people who may be involved in a real-world incident were used. For example, the control room messages were recorded with a real-life control room operator and the ‘FRS Chief’ recording was the voice of the actual Chief of the FRS in the region where the study was conducted. Audio clips were edited using ‘Audacity’ software to cut the clips to size and overlay sound effects (e.g. traffic noise; sirens). SMEs listened to the final clips and adjustments were made according to their recommendations (e.g. traffic noise too loud). Audio clips were then coded into Hydra and a slow-time pilot exercise was conducted to test the simulation. A key learning point that emerged from the pilot exercise was to ensure a ‘loggist’ was present in the simulation room with the delegates to operate the ‘decision log’ and ‘communicator’. This was because the team member who acted as ‘loggist’ in the pilot exercise felt distracted by logging duties and thus didn’t engage with the exercise. Postgraduate students acted as the ‘loggist’ during the study, who passively logged decisions on the system whenever requested to by the delegates. It was made clear to delegates that they must instruct their ‘loggist’ on what to type in a verbatim format.

6.3.3.4 Step four: Recruiting participants

Participants were recruited by the SMEs who were involved in the project. In order to align with the requirements of this thesis, and due to the command-level that the simulation training was designed, SMEs recruited ‘command level’ decision makers. SMEs distributed emails via their internal communications teams, which contained the information sheet outlining the details of the study (Appendix Six). The information letter outlined the general aims of the simulation and detailed both training and research goals. This aligned with the ethical approval that was granted by the University of Liverpool’s Ethics Committee. Individuals who agreed to

participate were allocated a date and time slot to attend the University of Liverpool and participate in the simulation.

6.3.3.5 Step five: Conducting the simulation

Simulations took place in the Hydra Suite located at the Centre for Critical and Major Incident Psychology at the University of Liverpool. Participants were provided with limited information about the specifics of the exercise in order to increase realism of an unanticipated major incident. On arrival, delegates were introduced to one another, the SME team, the research team and their loggist. Importantly, it was made clear that the loggist would only type when instructed to ensure that the team were responsible for proactively logging their own decisions. They were also given a short tutorial on how to use the Hydra system and provided with the opportunity to ask questions. They were asked whether they still wished to participate in the exercise and given the opportunity to leave. Ethical approval was provided when they signed the ethical consent forms that were provided (Appendix Four).

The beginning of the exercise began by seating delegates in a room external to the Hydra suite. They were then provided with a piece of paper, which outlined preliminary agency-specific information on the incident and resource mobilisation (Appendix Seven). They were asked to think about the information and to imagine that they were ‘en route’ to the incident with an ETA of 5 minutes. Participants were left alone in the room whilst the ‘facilitator team’ made their way to the control room. The facilitator team consisted of one SME from each agency and two researchers: (i) the primary researcher; and (ii) an additional researcher who assisted with exercise control. After five minutes, participants were moved into the syndicate room and received their initial inject (Table 6.2).

The syndicate room contained spare paper and three maps of the railway station: one close up of the station concourse; one of the station and immediate surrounding area; and another aerial view of the station and wider surrounding area (Figure 6.3). The exercise was monitored by the SMEs, who advised when the next inject should be provided (i.e. when they felt that the group had effectively responded by asking questions and logging decisions). Variability in this process was reduced by using the same SMEs across all 13 exercises. SMEs also helped to answer agency-specific

questions by, for example, providing local information on where the British Transport Police headquarters was located in the region that the exercise took place. On finishing the simulation, participants went back into the plenary room and completed a questionnaire (Appendix Nine). The SMEs then led an informal debrief with participants, which focussed on their training objectives (i.e. joint decision making and JESIP).

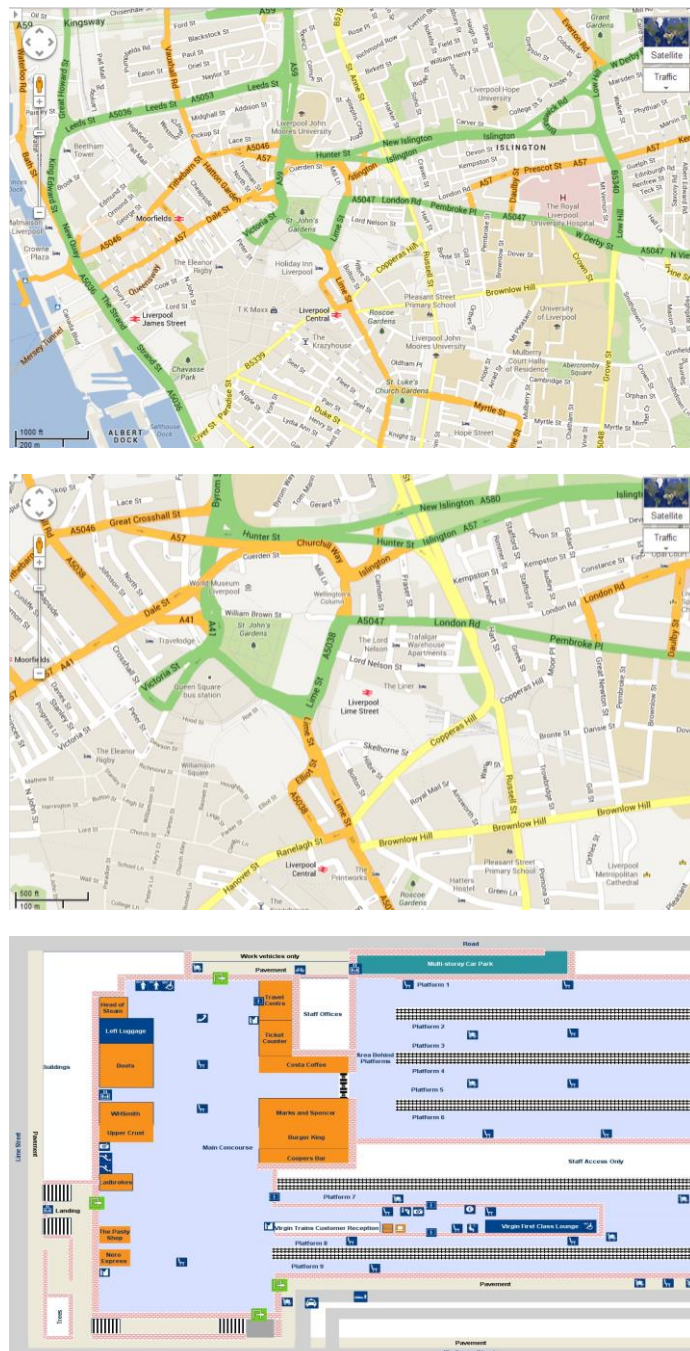


Figure 6.3: Maps provided to participants in simulation

6.3.4 Materials

6.3.4.1 Decision Log

Delegates were asked to log their decisions on the electronic decision log. The decision log had two boxes in which to type information: (i) one for their ‘decision’; and (ii) the second for their ‘rationale’. Logs were used to identify the *time* it took for teams to respond to a decision task. Specifically, the two key decisions identified by the SMEs (i.e. zoning decision; non-specialist staff at RVP decision) were used to measure the time lag between the provision of the decision task (i.e. to make a decision on zoning and log it on the computer) and the time the team logged their choice (e.g. zones are x, y, z).

6.3.4.2 Questionnaire

Participants completed a questionnaire at the end of the simulation, which took a variety of measures relating to the exercise. For the purposes of this chapter, participants were asked to identify their top three goals during the simulation. They were also asked whether they perceived goals to be consistent between different agencies. Furthermore, two questions were included to ‘validate’ the realism of the simulation using a ranking scale from 1 (strongly disagree) to 7 (strongly agree). Participants’ mean score for ‘realism’ fell in the ‘agree’ range ($M=5.90$, $SD=.99$) with no significant differences between agencies, $F(2,49)=.610$, $p=.548$. Participants’ mean score for feelings of ‘high-risk’ fell within the range of ‘agree’ to ‘strongly agree’ ($M=6.14$, $SD=1.06$) with no significant differences between agencies, $F(2,49)=1.946$, $p=.154$. This indicated that participants found the simulation high-risk (as per the requirements of the exercise) and realistic. Data was analysed using SPSS 21.

6.4 Results

6.4.1 Summary

The two hypotheses and findings are outlined in Table 6.3. Generally, evidence was found to support the approach-avoidance distinction identified in Chapter 4; goals were either *approach* goals to make a positive impact on the situation or *avoidance* goals to prevent negative consequences from arising. However, results did

not support H1 as inter-agency goals were *not* consistent: PS participants expressed equal amounts of both approach and avoidance goals, FRS participants initially prioritised avoidance goals and then shifted in favour of approach goals, and AS participants consistently favoured approach goals. It is suggested that these goals reflect intra-agency focus. The PS are focussed both on the incident (approach) and post-incident demands (avoidance of further harm); the FRS initially showed avoidance goals as they sought to protect emergency responders from fire-specific high risk operations, however once safety was established they switched to pro-approach goals; and the AS held consistently high approach goals as their role is specific to patient treatment.

In terms of H2, it was found that when a team was characterised by approach goals (as the majority of team members held approach goals), they logged *faster* decisions early on in the incident (i.e. zoning task); however approach teams were found to be *slower* at decision making later in the incident (i.e. non-specialist staff). This is an interesting avenue for further research on how *choice context* interacts with goal relevance; approach goals may facilitate decision making during the early stages of a problem but become maladaptive during complex decision making later into the incident when faced with multiple competing tasks. The overwhelming desire to achieve a *positive* impact on the incident may distract decision makers, as they seek to optimise mutual and competing task demands.

Table 6.3: Summary table of findings for H1 and H2

Hypothesis	Found
H1: Self-reported goals between agencies will be consistent	Goals were <i>inconsistent</i> between agencies. They appeared to align with role-specific responsibilities: the PS participants goals were generally split between approach and avoidance; the FRS were firstly avoidance oriented and then shifted to approach; and the AS were consistently approach oriented. Importantly, commanders (wrongly) perceived inter-agency goals to be consistent.
H2: Holding approach goals will increase decision making speed and reduce overall decision inertia	Approach goals were associated to <i>faster</i> decision making at the initial stages of the incident (i.e. zoning task); but were associated with <i>slower</i> decision making during more complex choices further on into the incident (i.e. non-specialist staff).

6.4.2 H1: Self-reported goals between agencies will be consistent

6.4.2.1 Main goals

Participants were asked to “*List in order your main three goals from the scenario (from most important)*” in an open text box. Six different goals were identified by participants via inductive coding. They were:

- i) Save life/treat patients
- ii) Protect emergency responders from harm
- iii) Establish shared situational awareness/joint working
- iv) Protect the public from further harm
- v) Locate/neutralise threat
- vi) Prepare for post-incident demands

As depicted in Figure 6.4, the most prevalent goal overall was to ‘save life/treat patients’ (27.2%), followed by ‘protect emergency responders from harm’ (22.1%), ‘establish shared situational awareness/joint working’ (21.3%), ‘protect the public from further harm’ (16.2%), ‘locate/neutralise threat’ (8.8%) and ‘prepare for post-incident demands’ (4.4%). PS participants’ most commonly cited goal overall was to ‘locate/neutralise threat’ (22.3%), followed by ‘protect the public from further harm’ (20.5%), ‘protect emergency responders from harm’ (20.5%), ‘save life/treat patients’ (13.6%), ‘established shared situational awareness/joint working’ (11.3%) and ‘prepare for post-incident demands’ (6.8%). For the FRS participants, ‘save life/treat patients’ was the most common goal (29.0%), followed by ‘protect emergency responders from harm’ (25.8%), ‘establish shared situational awareness/joint working’ (24.2%), ‘protect the public from further harm’ (16.1%) and ‘prepare for post-incident demands’ (4.8%). Likewise, ‘save life/treat patients’ was the most common goal for AS participants (43.3%), followed by ‘establish shared situational awareness/joint working’ (30.0%), ‘protect emergency responders from harm’ (16.6%) and ‘protect the public from further harm’ (10%).

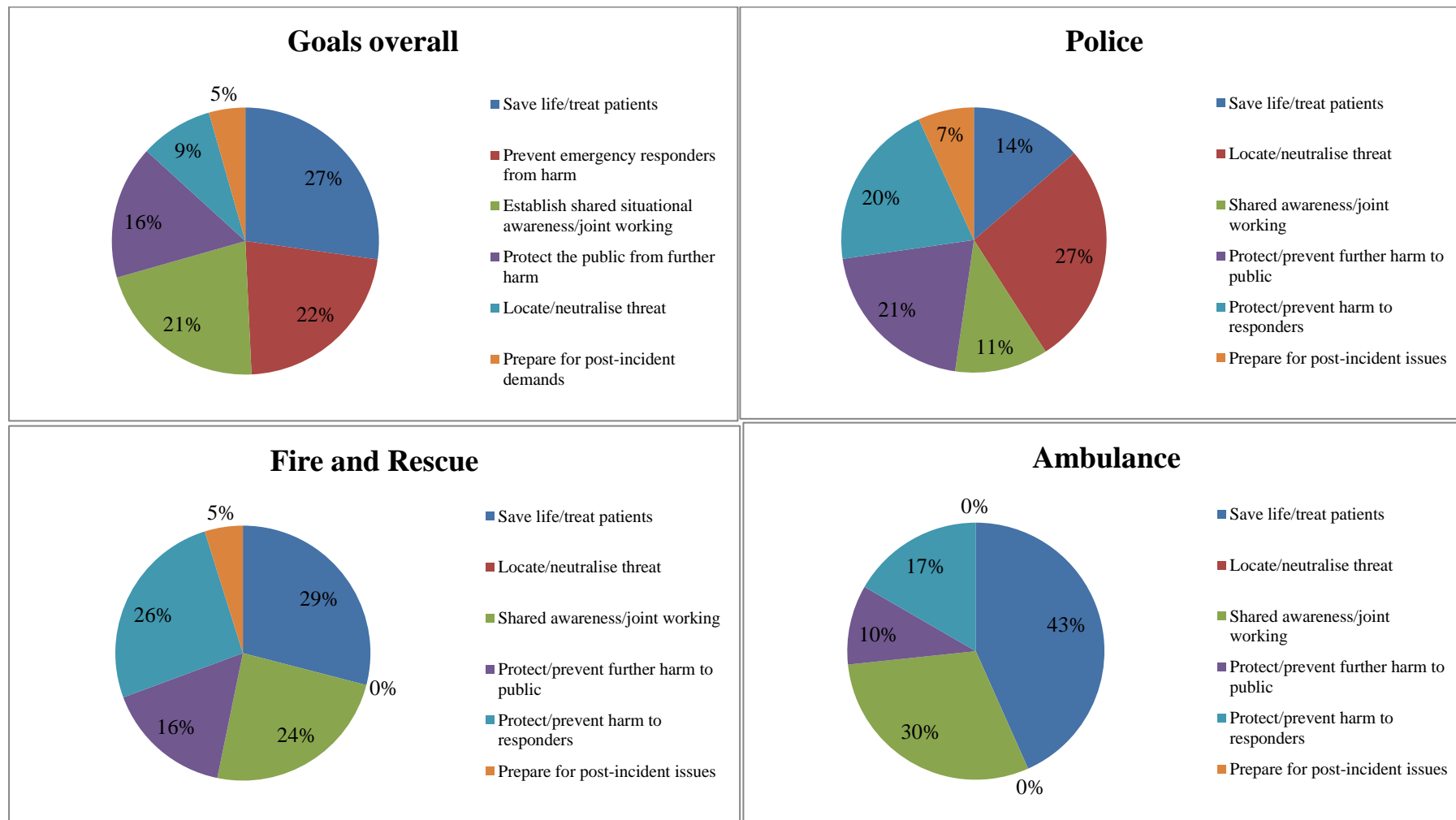


Figure 6.4: The prevalence of different goal types overall (within groups) and for each individual agency (between groups)

Chapter 4 identified that the motivational goals of emergency response commanders tended to be either: (i) ‘approach’ oriented, with the aim to *make a positive* impact on the situation; or (ii) ‘avoidance’ oriented, with the aim to *prevent a negative* impact on the situation. Support for these findings was found in this study as the six identified goals were deductively coded using this distinction (Table 6.4). There was a relatively even split between the prevalence of approach and avoidance goals overall, as 57% of goals were approach oriented compared to 43% coded as avoidant. Participants were asked to specify the order of importance of their goals from ‘most important’ to ‘second most important’ to ‘third most important’. Although the prevalence of approach goals increased across these three measures, from 53% (most important) to 57% (second most important) and 62% (third most important), a McNemar’s repeated measures chi-square test found that the shift in goal orientation was not significant, $p=.541$.

Table 6.4: The ‘approach’ or ‘avoidance’ classification of each of the six goals

Goal orientation	Original goal
Approach goal	Save life/treat patients Establish shared situational awareness/joint working Locate/neutralist threat
Avoidance goal	Protect emergency responders from harm Protect the public from further harm Prepare for post-incident demands

6.4.2.2 Intra-agency differences in approach / avoidance goals

Data was explored to see if there were any differences between agencies in terms of their goal orientations. Overall, 52.2% of PS participants’ goals were approach oriented along with 53.2% of FRS participants’ and 73.3% of AS participants’ goals. This suggested that whereas both the PS and FRS participants had fairly even proportions of approach to avoidance goals, AS participants were predominantly approach oriented. A Pearson’s chi-square test found a significant interaction between agency membership and overall goal orientation, $\chi^2(2)=6.236$, $p=.04$, with a large effect size (Pallant, 2010), *Cramer’s V*=.364. Odds ratios indicated that AS participants were 11.58 and 9.90 times more likely to express *approach* goals overall than PS participants and FRS participants, respectively. FRS

participants were also 1.18 times more likely to express approach goals than PS participants. There was also a significant interaction between agency membership and goal orientation for what participants identified to be their ‘most important’ goal, $\chi^2(2)=7.42$, $p=.024$, which had a large effect size, *Cramer’s V*=.406. Once more, AS participants were 14.63 and 9 times more likely to prioritise approach goals than FRS and PS participants, respectively. However, this time, PS participants were 1.62 times more likely to prioritise approach goals than FRS participants. Interestingly, when participants were asked to rate on a Likert scale whether they believed multi-agency were inconsistent, their mean score rested between ‘disagree’ and ‘somewhat disagree’ ($M=2.31$, $SD=1.21$), indicating that they believed inter-agency goals were relatively consistent. A one way ANOVA found that there were no significant differences between agencies in this opinion, $F(2,46)=.357$, $p=.702$. Thus, although self-reported goals suggest that agencies’ goals implicitly differed, it appeared at the explicit level that participants were unaware of these nuanced differences.

Data was also explored to see how goal prioritisation changed in order of importance for each agency (Figure 6.5). PS participants’ goals remained relatively unchanged, showing a steady split between approach and avoidance goals; FRS participants’ goals became increasingly approach oriented over time, as only 38.1% of FRS participants identified approach goals as their most important goal, compared to 70% of participants as their third most important goal; and AS participants consistently favoured *approach* over avoidance goals. This provides support for qualitative findings in Chapter 4, which identified how goals appeared to differ between agencies as a function of agency-specific responsibilities. Specifically, the PS are responsible for considering both ‘save life’ (approach) goals and ‘prevent further harm’ (avoidance) goals as they are responsible for both critical incident and post-incident management of the public; the FRS prioritised ‘save life’ but also placed a great deal of emphasis on ‘preventing further harm’ due to the inherent risk associated to their capabilities, which may explain why their goal orientations adjust over time from avoidant (or protective) to approach; and the AS, whose primary role is to treat patients, held consistently approach oriented goals as their main purpose during emergencies is to access and treat patients.

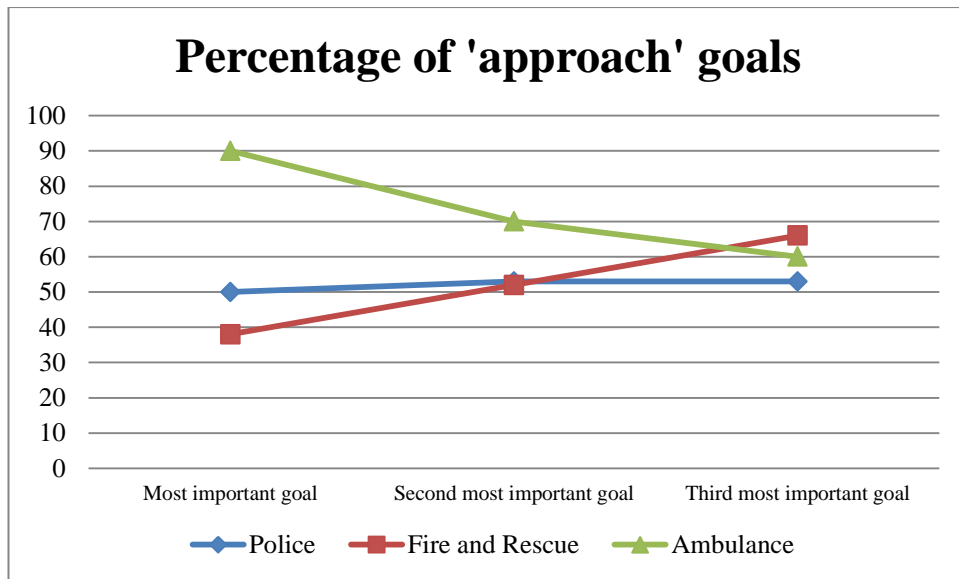


Figure 6.5: Percentage of participants within each agency who identified ‘approach’ goals as their most important, second most important and third most important goals

6.4.3 H2: Holding approach goals will increase decision making speed and reduce overall decision inertia

The time taken to log decisions was measured at two key decision points: (i) identification of hot/warm/cold zones; and (ii) the decision on whether to commit additional non-specialist staff to the risk area or not (Table 6.2). These two decisions were identified by SMEs to be challenging for participants as they were non-time bounded choices that were ambiguous, high-stakes and required agreement from all three agencies. Time was digitally recorded on decision logs and time in minutes calculated from presentation of the decision task to the point in time that a relevant decision was logged. SMEs helped to identify the point of time in which a relevant decision had been logged (and thus time stamped).

The overall total time that it took teams to complete the exercise ranged from 66 to 90 minutes in total, with a mean exercise length of 78.61 minutes. For the zoning task, time ranged from 6 to 21 minutes, with a mean length of 13.07 minutes; for the non-specialist staff task, time ranged from 2 to 36 minutes, with a mean average length of 7.61 minutes. Mann Whitney U-tests found no relationship between goal orientation and time taken to log decisions overall, $U=247.50$, $p=.582$, for the zoning

decision, $U=260.50$, $p=.788$, or the non-specialist staff decision, $U=238.00$, $p=.450$. However, it was suspected that this was due to a methodological issue, as approach-avoidance orientations were coded at the *individual* level, whereas time of decision was coded at the *team* level; thus participants would have a collective team-level dependent variable (i.e. decision time), but individual approach or avoidance goals. In order to address this, data was re-coded at the *team* level using a majority rule (i.e. if the majority of team members were *approach* oriented then all participants within that team were coded as having *team approach* goals). To provide more explanatory power to findings, the time taken by teams was split into a dichotomous variable based upon a median split to measure those teams that were *faster* or *slower* at decision making.

A Pearson's chi-square found that, across the incident as a whole, team goal orientation did *not* interact with the time taken to complete the exercise, $\chi^2=.105$, $df=1$, $p=.746$, $\phi=.098$; holding predominantly approach (or avoidance) goals overall did not lead to faster (or slower) decision making. Yet there was found to be a significant interaction between time taken to complete the scenario and a team-level goal orientations for participants' *most important* goal, $\chi^2=4.425$, $df=1$, $p=.035$, $\phi=-.351$. Specifically, *approach-oriented* teams were 4.891 times more likely to be *slower* at decision making across the incident as a whole. This appeared to be due to significant delays for the 'non-specialist staff' decision, $\chi^2=14.089$, $df=1$, $p<.001$, $\phi=-.593$, as approach teams were 25.71 times more likely to be *slower* at making this decision than those who were avoidance oriented. For the zoning task however, the opposite effect was found, as approach teams were 3.92 times more likely to make *faster* decisions, albeit following Yates' continuity correction for 2x2 chi-square analyses, this effect no longer fell within significance, $\chi^2=3.485$, $df=1$, $p=.062$. It is suggested that these differences may be due to the timing of these decisions, whereby approach goals *facilitate* action during the initial stages of the incident but can *inhibit* action later into the incident when maximising strategies to achieve the most positive outcome are more difficult to achieve due to the increasingly information rich and complex environment. Unfortunately, as data on goal orientations was collected at the end of the incident, it was not possible to test for specific differences in goal orientations at the time of each decision. This is an acknowledged limitation in the design of this study design and further research could

take ‘in vivo’ measurements by asking participants to explicitly identify their goals whenever they log a decision.

6.5 Discussion

This chapter outlined two hypotheses relating to the interaction between goals and decision making in multi-agency emergency response environments (Table 6.3). Against H1, it was found that goals between agencies were *inconsistent*. Although explicit measures indicated that participants perceived inter-agency goals to be aligned, implicit coding of their self-reported goals suggested that they differed as a result of their agency-specific roles. PS commanders reported *both* approach and avoidance goals relatively evenly, relating to their need to both respond to the incident and protect against further negative effects post-incident; FRS commanders initially prioritised avoidance goals and then shifted towards approach goals, relating to their need to take initial steps to mitigate risk prior to commencing their complex procedures to rescue victims; and AS commanders were consistently approach oriented, relating to their role to take proactive steps to treat patients at the scene. H2 predicted that approach goals would make decision making *faster*. Although it was found that during the *initial* stages of the incident that approach oriented teams made *faster* decisions, this effect reversed later into the incident and they became *slower* at decision making. It is suggested that the unexpected negative impacts relating to approach goals are due to the functional mismatch between the desire to make a positive impact on the situation when operating in complex and time-pressured environments with competing task demands. Each of these findings will be discussed in detail below.

6.5.1 H1: Self-reported goals between agencies will be consistent

The UK government’s JESIP initiative is a national programme that seeks to increase the frequency and effectiveness of interoperability and joint working in the emergency services. It is based on the premise that the emergency services share two common goals when responding to a multi-agency emergency to ‘save life’ and ‘reduce harm’ (JESIP Doctrine, 2013). Theoretically, if agencies hold clear common goal intentions, then this should enable the achievement of collective objectives (Gollwitzer & Sheeran, 2006). Shared goals in multi-team emergency response settings are useful for translating intra-agency specific goals into collaborative inter-

agency action (Marks et al., 2001; Mathieu et al., 2000; Millward et al., 2010). According to the Theory of Planned Behaviour (Ajzen, 1991), goal accomplishment is dependent upon an individuals' *intention* to achieve their goal. Strong goal intentions are a result of perceived control over the situation, positive attitudes towards the behaviour and, importantly, perceive favourable social attitudes in the decision making setting. It has also been identified that setting *specific* goals, over abstract goals, can facilitate action by orienting individuals towards clearly defined objectives (Locke & Latham, 1990; 2002). In the absence of strategic goals, multi-team systems fail as individuals focus on intra-team goals over more collective joint objectives, which increase decision inertia (Alison, et al. 2015). Commanders operating in social and multi-agency team environments should benefit from the identification of 'save life' and 'reduce harm' goals; they should serve to orient behaviour around collective, mutually beneficial and clear objectives.

However, results from both this study and previous qualitative analyses suggest that commanders do *not* necessarily share common goals. PS commanders expressed goal conflict between approach and avoidance goals, the AS held consistently high approach goals, whereas the FRS shifted their goal orientation from initial avoidance to later approach. It is suggested that this may be a result of differences in their specific roles at an emergency incident. The PS not only hold responsibility for responding to the emergency by taking approach actions to 'save life', but they are also responsible for preventing further harm arising and ensuring that normality is returned to as quickly as possible. It is suggested that this explains their relative split between approach and avoidance goals, as they experience goal conflict between whether they should focus making a positive impact on the situation through action versus the desire to prevent further harm arising by limiting action. The AS has responsibility for treating patients, which may explain their consistently high desire to approach and take action. As their role at an emergency incident is highly specialised to gaining access, treating and transporting patients to hospital, they do not have any further responsibilities relating to the prevention of harm. As such, they showed consistently high approach goals. For the FRS commanders, it is suggested that their shift in goals from avoidance to approach is once more reflective of their role. Indeed the FRS has responsibility for accessing and rescuing patients (approach) but this often requires a great deal of technical skills and risk to their own

staff. Thus this initial priorities are to establish safe working practices in order to ensure a safe and resilient approach, but once this is established they then focus on their role-specific requirements to access and rescue casualties.

Interestingly, when participants were asked about their goal consistency, they all agreed that goals were consistent across the multi-agency team. This is counterintuitive to the evidence presented above, which suggests that teams did not share collective goals. It is possible that this may be due to the relatively abstract nature of the JESIP (2013) goals to ‘save life’ and ‘reduce harm’, creating ambiguity and inconsistent assumptions between agencies. Indeed, abstract and poorly defined goals can induce poor team coordination (Hackman, 2002; Locke & Latham, 1990). Poor team coordination can reduce the likelihood of action and goal accomplishment (Marks et al., 2001; Alison et al., 2015). There appears to be an inherent misunderstanding between agencies about strategic objectives; inducing erroneous assumptions that agencies are working towards the same outcomes although they interpret this goal in very different ways. Even if commanders express ‘save life’ as a common strategic goal intention, it appears that their goals are somewhat inconsistent at the more behavioural implementation intention level as they prioritise different acts. Commanders may share common goal intentions (i.e. to ‘save life’) yet disparate and somewhat contradictory implementation intentions (Gollwitzer & Sheeran, 2006). Alternatively, findings may be related to differences between implicit and explicit goals. Research has suggested that there is a distinction between implicit, unconscious and emotional motives and more explicit, cognitive and rational goals (Schultheiss & Brunstein, 1999). Individuals may explicitly state one goal, but implicitly orient towards another. It is possible that this disconnect between implicit and explicit processing may offer an explanation for why commanders explicitly perceive goals to be aligned despite the evidenced implicit differences in the qualitative coding of self-report measures.

6.5.1.1 Implications for H1

It is possible that in order to make goals more consistent between emergency responders, that training to align differences between explicit and implicit goals would help. It has been suggested that training to enhance goal imagery (i.e. the mental representation of pursuit and attainment of a goal) can facilitate implicit and

explicit goal alignment (Schultheiss & Brunstein, 1999). Indeed, a recommendation provided by a commander in the qualitative interviews suggested that visually displaying goals by stating, and updating, on a white-board can help visually clarify cross-agency goals during an incident. Chapter 4 outlined how commanders often felt frustrated with other agencies for not understanding their capabilities or assuming inaccurate facts about their roles and responsibilities. It is possible that interventions to educate commanders about role-specific differences in behavioural goals may reduce these negative social effects, thereby increasing collective intentions towards strategic goals.

Alternatively, rather than seeking to align goals between emergency response agencies, it may be more useful to focus efforts on developing a more effective distributed team network. Despite the desire of JESIP to create more ‘interoperable’ emergency services in the UK, it is possible that the current conceptualisation of interoperability in order to develop *joint* decision making practices is inconsistent with the inherent complexity associated with emergency incidents (House, Power & Alison, 2013). Complexity instead requires expertise in the discrete areas for each agency, and thus joint decision making may impede agency-specific action. A decentralised approach to emergency responding whereby the PS, FRS and AS have clearly delineated roles and responsibilities may be more adaptive. This raises important questions about the strategic objectives of JESIP and their relevance to real-world responding. It is recommended that increased multi-agency understanding and working is beneficial to emergency responding, however it must be taught in a manner that respects and enshrines the nuanced differences between each specific response agency.

6.5.2 H2: Holding approach goals will increase decision making speed and reduce overall decision inertia

Research has generally suggested that holding approach goals is adaptive for decision making and action. It is associated with positive affect and the desire to move towards a positive stimulus (Bossuyt et al., 2014; Elliot, 2006). Alternatively, avoidance goals are linked with the desire to avoid failure associated with negative affect, anxiety and depleted self-regulatory resources (Oertig, Schuler, Brandstatter, Rosekes & Elliot, 2013; Elliot, 2006). Indeed the positive or negative valence of

emotions can have a large impact on decision making. It has been suggested that emotions are key for motivating decision making and driving it alongside cognitive goals (Damiso, 1991). The negative affect associated with avoidance motivations may thus act as a negative marker on the decision making process. As such, it would be reasonable to assume that approach motivation, in comparison to avoidance, would have a *positive* impact on decision making in emergency response settings and that this may lead to more timely action. Furthermore, time-pressure appears to have a greater performance-degrading effect on individuals who hold avoidance goals (Roskes, Elliot, Nijstad & De Dreu, 2013). It was expected that the time pressured and complex nature of the emergency response environment would thus negatively interact with avoidance goals and delay decision making.

Interestingly, findings from this study were inconsistent with predictions. As expected, approach motivations were associated with *faster* decision making in the early ‘zoning’ task. They appeared to galvanise emergency teams to take positive action by logging rapid decisions. However, unexpectedly, it was subsequently found that teams characterised by approach goals made *slower* decisions during the later ‘non-specialist staff’ decision. This contradictory effect may be a result of task complexity. It is possible that the initial ‘zoning’ task was easier as it was presented very early on in the incident with few competing tasks; whereas the ‘non-specialist staff’ choice was much later into the incident (inject seven) whereby additional complexity and other tasks competed for attention. It is suggested that approach motivations galvanised rapid action earlier on in the incident as there were fewer competing tasks to respond to, whereas it degraded choice at the second major task as there were multiple competing task demands. For example, commanders also had to respond to an ongoing fire (inject 6), manage information on the location of shooters (inject 5) and deal with the time-criticality of victims’ health status (inject 4).

6.5.2.1 Implications for H2

In support of the complexity hypothesis, research on exam performance in schools has indicated how approach goals are positively related to exam performance, but that their positive impact on performance is *mediated* by the perceived difficulty of the exam (Darnon, Butera, Mugny & Hulleman, 2009). This

suggests that approach goals facilitate performance but only because they are associated with perceived ease. As discussed, abstract or unclear goals degrade performance (Hackman, 2002; Locke & Latham, 1990). Thus, even when commanders were motivated to take positive action, perhaps a lack of tactical goal clarity (i.e. implementation intentions) and competition between mutual approach goals reduced action likelihood. It may also be related to perceived time pressure at the incident, which may have increased over time. Time pressure has been found to have a U-shaped impact on performance, whereby both extreme small amounts and large amounts disrupt performance (Baer & Oldham, 2006). Emergency incidents are inherently time pressured (Chen et al., 2008) yet the experience of time pressure may fluctuate over the course of the emergency event. Time pressure earlier on in the incident may reflect more optimal levels, but this then increases and exceeds acceptable thresholds later on. This is an interesting avenue for further research via the more explicit monitoring of perceived time pressure over the simulation as a whole.

The unexpected finding on the interaction between goal orientations and decision timeliness thus offers an interesting and fruitful avenue for further research. It is theorised that the contextual functionality of goals may offer an explanation. Namely that when choices become overly time pressured and complex, that approach goals become maladaptive as individuals struggle to trade-off multiple competing sub-goals and tasks. A limitation with the present study was that approach / avoidance goals were coded at the *end* of the simulation and thus it is not possible to explicitly identify participants' specific goals at the point of decision making. Furthermore, there were no explicit measures of time pressure or perceived decision complexity during the simulation. It would be useful to further extend this study by asking participants to fill in a short Likert-scale log at prescribed time points throughout the incident in order to monitor how goals, perceived complexity, time pressure and decision timeliness interact. The implications of such research would help extend the psychological understanding of the functional relevance of approach and avoidance goals, and further provide a basis to develop training in the emergency services that identifies when and under what circumstances different goals are most appropriate for facilitating action.

6.6 Conclusion

This chapter sought to explore the relationship between self-reported goals and behaviour in a simulated multi-agency emergency environment. It emerged that, although respondents perceived their goals to be similar, analyses of goals at the intra-agency level revealed differences in orientation tendencies: the PS were split between approach and avoidance goals; the FRS showed initial avoidance followed by mainly approach goals; whereas the AS were consistently approach oriented. It is suggested this reflects the *roles* of each agency, as the PS have responsibilities for both the incident (approach) and post-incident (avoidance) demands; the FRS often undertake actions that are highly specialist and may risk emergency responder safety (avoid) but then, once they have established safety precautions are able to focus on rescuing civilians (approach); and the AS' main role is to provide treatment to patients (approach). At the team-level, it emerged that approach motivations were beneficial for decision making earlier on in the incident, but induced significant decision delays later in the incident. In explaining this effect, it is suggested that approach goals became maladaptive to decision making as the incident progressed, becoming more complex with multiple competing tasks that induced goal conflict. Thus, it is important when developing interventions and training for emergency service practitioners to: (i) develop a nuanced understanding of agency-specific roles and responsibilities and how that interacts with implementation intentions; and (ii) that there is a greater focus on the functional relevance of approach goals when operating in complex task environments.

Chapter 7: When cognitive flexibility impedes choice: how different cognitive processing styles interact with the experience of outcome, task and retrospective uncertainty

7.1 Abstract

This chapter investigates how individual differences in cognitive processing interact with decision making during a simulated terrorist incident (see Chapter 6). It extends previous findings within this thesis, which identified how the experience of uncertainty was associated to decision inertia. A total of n=50 commanders from the emergency services completed a multi-agency simulated exercise of a terrorist incident. They were split into n=13 multi-agency teams, each participating in the same simulation. Questionnaire data was collected at the end of the simulation, which used ranking scales on a number of items that explained why their decisions may have been delayed. They also completed two scales to measure individual differences in ‘Need for Closure’ (NFC) (Kruglanski, Wester & Klem, 1993) and Cognitive Flexibility (CF) (Denis & Vander Wal, 2010). This was to see whether individual differences in cognitive processing moderated the experience of uncertainty. A Principle Components Analysis reduced the questionnaire data and identified three types of uncertainty: (i) task uncertainty; (ii) outcome uncertainty; and (iii) retrospective uncertainty. Of these, outcome uncertainty was the most prevalent for all participants and for all agencies. It also emerged that individual differences in cognitive processing styles interacted with the experience of uncertainty. Those who scored high on the ‘control’ subscale for CF, which reflects trait flexibility in decision making due to a tendency to perceive control over difficult situations, had significantly lower scores on task and retrospective uncertainty. Interestingly, those who scored high on the CF ‘alternatives’ subscale, who tend to consider multiple explanations and solutions to difficult problems, had much *higher* scores on outcome uncertainty. This suggests that CF with regards to the consideration of alternatives may *impede* choice when operating in complex environments whereby *fast* decision making is necessary.

7.2 Introduction

This chapter explores how: (i) uncertainty interacts with decision making in emergency incident contexts; and (ii) how individual differences in cognitive

processing styles may moderate the experience of uncertainty. This is to extend upon previous qualitative findings that outlined a number of different factors that contributed to uncertainty in emergency incident contexts. Thus, this chapter will:

- (i) Describe how uncertainty can negatively interact with decision making in extreme environments
- (ii) Introduce the literature on how individual differences in cognitive processing styles may moderate the experience of uncertainty, specifically focusing on:
 - a. Need for Cognitive Closure (NFC) (Kruglanski et al. 1993)
 - b. Cognitive Flexibility (Denis & Vander Wal, 2010)
- (iii) Describe results from questionnaire data collected from an immersive ‘terrorist’ simulation with the emergency services
- (iv) Discuss implications for findings with regards to the relevant application of cognitive processing styles in complex, time-pressured environments

7.2.1 Uncertainty in extreme environments

Uncertainty is pervasive in emergency response domains. To recap what has been previously outlined in this thesis, emergencies are high-stakes, high-consequence and highly ambiguous events (Alison & Crego, 2007), characterised by missing and conflicting information (Bharosa, Lee & Janssen, 2010) and exacerbated by time pressure (Chen, Sharman, Rao & Upadhyaya, 2008). They reflect extreme environments, which place large demands on the physical, psychological and interpersonal skills of the decision maker (Orasanu & Lierberman, 2011), which can lead to cognitive overload and stress for the decision makers involved (Paton & Flin, 1999). The inherent characteristics of emergencies make decision making more difficult as the high stress associated with such extremes exceeds the cognitive capacity of individuals to both self-regulate their decision making according to goal-relevant information, whilst attempting to manage stress (Drach-Zahavy & Erez, 1997). The setting of goals in complex emergency domains can help to orient decision making around specific objectives (Locke & Latham, 2006), but when inappropriately used can degrade choice due to associated goal conflict.

Not only are emergency incidents characterised by ambient (i.e. relating to the inhospitable environment) and task (i.e. relating to human activity) extremes, but they are further threatened by social extremes (i.e. relating to life-threatening reliance on others in team) (Orasanu & Lieberman, 2011). Problem solving in teams is contingent upon effective communications, which share information, direct actions and reflect thoughts on the problem task (Orasanu, 1994). Teams must communicate in continual and iterative cycles to develop shared knowledge that informs action (Hutchins & Kendall, 2011). It is therefore paramount when teams operate in extreme environments that they are able to effectively manage the experience of uncertainty that may impede group performance (Fiore, Rosen & Salas, 2011). Fundamentally, emergency incidents reflect extreme and uncertain team environments, which may contribute to decision inertia.

7.2.2 Coping with uncertainty in extreme environments

Due to the negative impact of uncertainty on decision making, coupled with its inherent prevalence in extreme decision making settings, a great deal of research has attempted to identify strategies to try and reduce the experience of uncertainty. For example, the development of *expertise* in organisational settings can help to reduce uncertainty by providing decision makers with recognition-primed responses that facilitate intuitive action (Klein, 1998; Jenkins, Stanton, Salmon, Walker & Rafferty, 2010). Experienced decision makers have been found to develop adaptive heuristic and cognitive processing shortcuts based upon expert and accurate intuition that has been learnt through repeated exposure in the task environment, developing into adaptive expertise and innovative thinking (Hatano & Inagaki, 1986; Klein, 1998). For example, experienced police officers used specific cognitive shortcuts that helped them manage uncertainty, such as ‘reflection-in-action’ (i.e. reflecting on their choices whilst iteratively updating their situation assessment), which increased their ability to cope with uncertainty (van den Heuvel, Alison & Power, 2014).

However, rather than focus on the well-researched topic of expertise, this chapter was interested in exploring how individual differences associated to the tendency to use different cognitive processing styles interacted with the experience of uncertainty. The sample of commanders used in this study were well experienced and thus variability in expertise was limited; and further because it would be

interesting to explore for variability *within* the expert sample to identify which experts experience the least uncertainty, and what cognitive processing strategy they tend to use. Thus this chapter will now focus on how individual differences in cognitive processing can moderate the experience of uncertainty.

7.2.3 Individual differences in cognitive processing

Research on decision making under uncertainty has identified how individuals generally cope with uncertainty by *limiting* their systematic evaluation of the choice environment. Decision makers cope with complexity by *adapting* their cognitive processing style in response to the specific demands of the task environment. For example, in information-sparse and time-pressured incidents, individuals can limit uncertainty by taking decisive satisficing tactics to select, not the best, but a good enough option. This is linked to ‘attribute-based processing’, where decision makers evaluate their choice by only focussing on the most important attributes of each option to quickly identify an option that meets minimal thresholds (Patalano & Wengrovitz, 2007; Payne, Bettman & Johnson, 1993). Alternatively, if time pressure is low, individuals may be able to more systematically reduce uncertainty via close evaluation of options. This is associated to ‘alternative-based processing’, where decision makers evaluate all options in full in order to maximise outcomes and identify *if* any options are good enough (Parker & Schrift, 2011; Payne et al., 1993). Thus, in order to cope with uncertainty, the decision maker must adjust their cognitive processing in line with the most adaptive strategy for the choice environment.

Research suggests that individuals differ in terms of their innate *preferences* to utilise various cognitive processing strategies. These individual differences interact with the experience of uncertainty due to differences in cognitive processing styles (Orasanu & Lieberman, 2011). For example, those who score highly on ‘constructive thinking’, which refers to the ability to adapt to situations with minimal stress by, for example, perceiving difficult situations as ‘challenging’ rather than ‘threatening’ (Epstein, 1998), are better able to cope with complex environments (Drach-Zahavy & Somech, 1999). Constructive thinking enables individuals to manage their cognitive goals as they are able to adapt better adapt to the emotional demands of the problem environment. Although uncertainty is pervasive and detrimental to decision

making in extreme environments, its negative effects on choice outcome are not inevitable. It is important that research seeks to unpack the main causes of uncertainty in the emergency response domain in order to develop and test interventions to help commanders cope with and reduce uncertainty. This thesis focussed on two individual difference measures related to cognitive processing: (i) Need for Closure (NFC) (Kruglanski et al., 1993); and (ii) Cognitive Flexibility (CF) (Dennis & Vander Wal, 2010). It was anticipated that different scores on these individual difference would moderate the experience of uncertainty.

7.2.3.1 Need for Closure

The ‘Need for closure’ (NFC) scale measures the trait desire to achieve rapid closure to decision problems as a result of “*the desire for a definite answer on some topic, any answer as opposed to confusion and ambiguity*” (Kruglanski, 1989, p.14). Those who score high on NFC tend to limit their cognitive processing in order to achieve rapid closure to decision tasks. They are able to cope with uncertainty by using highly selective search patterns to make fast decisions. Indeed, research on consumer decision making has linked NFC with increased attribute-based cognitive processing and reduced information search (Choi, Koo, Choi & Auh, 2008); those who score high on NFC appear to chronically limit their information search patterns. Thus, it is anticipated that those who score high on NFC would experience less uncertainty.

Individuals who score highly on NFC tend to be characterised by five aspects: (i) a desire for order and structure; (ii) discomfort through ambiguity; (iii) decisiveness; (iv) predictability; and (v) close-mindedness (Webster & Kruglanski, 1994). Those high on NFC tend to favour familiar over new options when faced with a choice (Mannetti, Pierro & Kruglanski, 2007), which can make them subject to primacy effects (Webster & Kruglanski, 1994). Thus, although NFC may reduce the experience of uncertainty and increase decisiveness, it does not necessarily mean that decisions are more *accurate*. However, evidence has also suggested that those high on NFC only utilise these techniques when appropriate. NFC may actually act as an *adaptive* motivational mechanism that individuals use to appropriately manage uncertainty. For example, NFC was found to *mediate* the relationship between chronic behavioural inhibition system activation (linked to chronic anxiety) and

information search patterns (Czernatowicz-Kukuczka, Jasko & Kossowska, 2014). This means that people with chronic anxiety cope with uncertainty as they have developed adaptive NFC processing styles. It has further been suggested that, rather than NFC leading to *poor* decision outcomes due to a biased desire to satisfice, that it reflects a functional desire to reach conclusions; increasing information search if it will lead to faster closure when appropriate (Kruglanski, Webster & Klem, 1993). It is anticipated that NFC will be associated to lower levels of uncertainty, as individuals suppress their experience of uncertainty by making rapid choices.

7.2.3.2 Cognitive Flexibility

Another trait cognitive processing style that may explain deviations in the ability to cope with uncertainty is ‘Cognitive Flexibility’ (CF), defined as “*the ability to switch cognitive sets to adapt to changing environmental stimuli*” (p.242, Dennis & Vander Wal, 2010). CF is associated with increased dynamic thought processing (Martin & Anderson, 1998) and the ability to think adaptively under stress (Dennis & Vander Wal, 2010). It is linked to a *self-awareness* of alternatives when processing a choice, the *willingness* to adapt to changing circumstances and *self-efficacy* that one has the ability to be flexible (Martin & Anderson, 1998). Specifically, it can be measured along two sub-scales: (i) CF-control is associated with a tendency to perceive difficult situations as controllable; and (ii) CF-alternatives is linked to the ability to perceive multiple explanations and solutions to difficult problems (Dennis & Vander Wal, 2010). Thus, those high on CF must not only possess flexibility in their evaluation and processing of a situation, but also perceive control and self-efficacy over the situation to take action. The ability to think flexibility, coupled with perceived control, may therefore suggest that those who score highly on CF experience less uncertainty.

CF is linked to *emotional intelligence* (constructive thinking) as both of these measures describe the ability of an individual to *adapt* to situational requirements (Santos-Ruiz et al., 2012). Those high on CF tend to have more behavioural ‘scripts’ when faced with a complex task, which increases their options and flexible approach (Martin & Anderson, 1998). Indeed this may link to adaptive expertise, which reflects the ability to create novel solutions to problems (Hatano & Inagaki, 1986; Hatano & Oura, 2003) as those high on CF are motivated to *adapt* their behaviour in

response to the situation (Martin & Anderson, 1998). Adaptive expertise builds upon routine expertise by enabling novel and flexible decision making (Schwartz, Bransford & Sears, 2005) due to the possession of: (i) domain skills; (ii) metacognitive skills; and (iii) innovative skills (Hatano & Inagaki, 1986). CF is thus linked to adaptive expertise as individuals are able to perceive new solutions and approach problems in dynamic ways (Carbonell, Stalmeijer, Konings, Segers & van Merriënboer, 2014). Furthermore, CF is also linked to the ability to replace maladaptive thoughts with more adaptive thinking (Denni & Vander Wal, 2010). This means that individuals high on CF may be more optimistic and adaptive when processing complex environments, and thus better able to cope with uncertainty. Fundamentally, CF appears to be a positive cognitive processing style that facilitates the ability to cope with uncertainty. It is anticipated that those high on CF will thus experience less uncertainty.

7.2.4 Summary and aims

This chapter sought to investigate how emergency response commanders coped with uncertainty during a simulated terrorist incident. Questionnaire data was collected at the end of the simulation, which asked commanders to score their experience of uncertainty using a Likert-scale against items that were derived from the literature. It used these measures to further investigate the relationship between the experience of uncertainty and individual differences in cognitive processing styles relating to: (i) NFC (Kruglanski, et al., 1993); and CF (Denis & Wander Val, 2010). The following two hypotheses were derived:

- *Hypothesis 3 (H3): Items in the questionnaire will reveal different types of uncertainty*
- *Hypothesis 4 (H4): Those who score high on NFC and CF will experience lower levels of uncertainty*

7.3 Method

Data for this chapter was collected from a simulated ‘Marauding Terrorist Firearms Attack’ (MTFA) incident (see Chapter 6 for full details). It involved n=50 command level decision makers from the three blue lights services (PS n=17; FRS n=22; AS n=11) who were split into 13 multi-agency teams. Each team comprised of

between three and five members (see Table 6.1) who were each provided the same simulation (see Table 6.2 for timeline).

7.3.1 Procedure

Chapter 6 describes the procedure for designing and developing the simulation in more detail. In brief, the simulation was designed in collaboration between the researcher and a team of subject matter experts (SMEs) from the emergency services. It sought to both test and train multi-agency joint decision making in an immersive simulated environment. Participants were recruited using opportunity sampling via email, which was coordinated by the SMEs from each agency. Participants who were interested in participating were provided with a date and time to arrive at the University of Liverpool and participate in the study. On the day of their simulation, they arrived at the ‘Hydra’ simulation lab at the University of Liverpool and were placed inside a plenary room. In here they met with other commanders who would be participating in their simulation and introduced to their ‘loggist’ who was responsible for operating the computer system during the simulation. They were then given a short tutorial on how to use the Hydra system and the opportunity to ask questions. The exercise began by giving the participant an information sheet that contained agency-specific details (e.g. initial resource availability) about the unfolding incident (Appendix seven). They were told to envision that they were ‘en route’ to the incident with an ETA of five minutes and to think about their initial priorities. After five minutes had passed, participants were taken to the syndicate room where they were told to imagine they had arrived at the scene in a multi-agency group and the simulation timeline began via audio injects. A full description of this procedure is outlined in Chapter 6.

7.3.2 Materials

Data for this chapter was collected from a questionnaire that participants completed at the end of the simulation (Appendix ten). Two elements from this questionnaire were analysed (using SPSS 21) for this chapter: (i) experience of uncertainty; and (ii) individual differences in NFC and CF.

7.3.2.1 Questionnaire: measuring the experience of uncertainty

Uncertainty was measured by asking participants to rate their agreement with nine items derived from the literature that may explain why an individual delayed their choice. They used a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The nine items are outlined in Table 7.1.

Table 7.1: Nine items to measure experienced uncertainty

STATEMENT:
I was constantly trying to find an optimal solution to the problem
I wanted to wait and see what happened
I wanted to gather more information
I felt that I missed an earlier better opportunity to take action
I was concerned about wasting previously invested resources
There were too many options to pick between
I decided to focus on easier tasks first
There were not enough options to pick between
Goals between agencies were inconsistent

7.3.2.2 Questionnaire: Need for Closure and Cognitive Flexibility

Two individual differences scales were included in the questionnaire to measure differences in cognitive processing styles. Specifically, participants completed the 42 item ‘Need for Cognitive Closure Scale’ (Kruglanski et al., 1993) and the 20 item Cognitive Flexibility Inventory (CFI; Denis & Wander Val, 2010). The CFI is subdivided into two sub-scales: (i) CFI-control, which consists of seven items that measure “*the tendency to perceive difficult situations as controllable*” (p.248, Denis & Wander Val, 2010); and (ii) CFI-alternatives, which consists of 13 items defined as “*the ability to perceive multiple alternative explanations for life occurrences and human behaviour and the ability to generate multiple alternative solutions to difficult situations*” (p.248, Denis & Wander Val, 2010).

7.4 Results

7.4.1 Summary

Table 7.2 summarises the findings with regards to the two hypotheses of this chapter. Support was found for H3 as three distinct types of uncertainty emerged. A Principal Component Analysis (PCA) was used to reduce questionnaire items into

meaningful components. The experience of uncertainty could be themed into three different types: (i) outcome uncertainty; (ii) task uncertainty; and (iii) retrospective uncertainty. Overall, participants experienced significantly more outcome uncertainty than task or retrospective uncertainty. Support was also found for H4 as individual differences in cognitive processing styles interacted with the experience of different types of uncertainty. Although global scores on NFC and CFI were not significantly related to uncertainty, the two sub-scales of the CFI were. Specifically, CFI-control (tendency to perceive control over difficult situations) was *negatively* correlated to *task* and *retrospective* uncertainty; whereas CFI-alternatives (tendency to consider multiple explanations and solutions to complex tasks) was *positively* correlated to *outcome* uncertainty. Interestingly, this suggests that high trait CF with regards to the consideration of alternatives may *negatively* impact decision making by *increasing* uncertainty relating to anticipated consequences. Implications with regards to the functionality of cognitive processing styles when operating in extreme environments are discussed.

Table 7.2: Summary table of research question findings

Hypotheses	Results
H3: Items in the questionnaire will reveal different types of uncertainty	There were three types of uncertainty: (i) outcome uncertainty; (ii) task uncertainty; and (iii) retrospective uncertainty. Of these, participants experienced significantly more outcome uncertainty.
H4: Those who score high on NFC and CF will experience lower levels of uncertainty	Individual differences in NFC were not related to any differences in the experience of uncertainty. At the global level, individual differences in CF were not related to any differences in the experience of uncertainty; however the CFI-control subscale was <i>negatively</i> related to both task and retrospective uncertainty; whereas the CFI-alternatives subscale was <i>positively</i> related to outcome uncertainty.

7.4.2 H3 Results: Items in the questionnaire will reveal different types of uncertainty

The questionnaire contained nine items to explore different reasons for why participants may have delayed their choice (Table 7.1). A paired-samples Friedman

test was performed to see whether there were any differences in how participants scored rated these items. There was found to be a significant difference in participants' scores on these nine items, $\chi^2=218.031$, $p<.001$, however post-hoc analyses were at high risk of a Type 1 error due the high number of items being compared ($n=9$). A Bonferroni correction to reduce the risk of a Type 1 error was unfeasible as it would result in a highly selective alpha level of $p<.005$. The Bonferroni correction states that to reduce the risk of a Type 1 error that the alpha level should be divided by the number of measures included (i.e. $p<0.05/9=.005$). This would have resulted in a highly selective alpha level, which could strip the data of meaning.

In order to address this problem, a Principal Components Analysis (PCA) was used to reduce the data into meaningful components. PCA was selected over Factor Analysis as it is specified as useful for reducing the data *without* prior theoretical assumptions about the data. Although the sample size responding to the questionnaire was relatively small ($n=50$), it was adequate to run a PCA on the nine item scale. The minimum threshold for participant numbers when conducting a PCA is five times the number of items on the scale (i.e. $n=45$) (O'Rourke, Psych & Hatcher, 2013). The Kaiser-Meyer-Olkin value was .601, just exceeding the recommended value of .6 (Kaiser, 1970, 1974) and Bartlett's test of sphericity was significant; thus it was possible to factorise the correlation matrix using a PCA.

The initial PCA revealed four factors that had eigenvalues >1 , explaining a total of 72.41% of variance; 29.82%, 17.88%, 13.34% and 11.36% of variance respectively. Analysis of the screeplot indicated a break after the third component and so a three component model was retained and input into a subsequent forced three-factor PCA. As outlined in Table 7.3, all items had good to excellent loadings onto each component using the guidelines provided by Comrey and Lee (1992): $>.71$ is *excellent*; $.63-.70$ is *very good*; $.55-.62$ is *good*; $.45-.54$ is *fair*; $<.44$ is *poor*.

Table 7.3: Pattern and structure coefficients of the final three factor model from the PCA

Item:	Pattern coefficients			Structure coefficients			Communalities
	1 (task uncertainty)	2 (outcome uncertainty)	3 (retrospective uncertainty)	1 (task uncertainty)	2 (outcome uncertainty)	3 (retrospective uncertainty)	
I decided to focus on easier tasks first	.864			.857	.114	.185	.736
There were too many options to pick between	.780	-.165		.736			.575
There were not enough options to pick between	.658	.171		.696	.268	.217	.516
I wanted to gather more information		.785	-.248	.143	.790	-.203	.682
I wanted to wait and see what happened	-.171	.664		.260	.651	.353	.544
I was constantly trying to find an optimal solution to the problem		.628	.311		.637		.433
Goals between agencies were inconsistent	-.191	-.222	.866		-.223	.814	.758
I was concerned about wasting previously invested resources	.216	.389	.636	.423	.440	.699	.707
I felt that I missed an earlier better opportunity to take action	.411		.517	.531		.614	.534

Note: loadings highlighted in bold

The three-component solution explained a total of 61.02% of variance, with Component 1 contributing to 29.82% of variance, Component 2 contributing to 17.82% of variance and Component 3 contributing to 13.34% of variance. In order to

interpret results, an oblique rotation method (using Oblimin rotation) was used as this allowed for both independence (orthogonal) and correlation of factors, as recommended by Russell (2002). This rotation indicated strong loadings onto all three components, with substantial independence between items (Table 7.3). Each component was renamed in order to provide semantic meaning to the cluster of variables (Table 7.4), which were: (i) task uncertainty; (ii) outcome uncertainty; and (iii) retrospective uncertainty. There were found to be weak positive correlations between factors 1 and 2 ($r=.145$), factors 1 and 3 ($r=.237$), and factors 2 and 3 ($r=.031$).

Table 7.4: Task uncertainty, outcome uncertainty and retrospective uncertainty items

New Item – “I delayed my decision because...”	Original Item – “I delayed my decision because...”
I was uncertain about the task I was dealing with (task uncertainty)	I decided to focus on easier tasks first There were too many options to pick between There were not enough options to pick between
I anticipated possible solutions that may arise in the future (outcome uncertainty)	I wanted to gather more information I wanted to wait and see what happened I was constantly trying to find an optimal solution to the problem
I was distracted by past poor decision processing associated to impeded knowledge and past action (retrospective uncertainty)	Goals between agencies were inconsistent I was concerned about wasting previously invested resources I felt that I missed an earlier better opportunity to take action

A one-way repeated measures ANOVA was conducted to see whether there were differences in the experience of these three types of uncertainty. A significant main effect was found, Wilks' Lambda=.162, $F(2,47)=116.576$, $p<.001$, with a large effect size $r=.838$. Post-hoc analyses indicated that this effect was significant across all three components, as outcome uncertainty ($M=13.98$; $SD=2.79$) was scored significantly higher than task uncertainty ($M=6.40$; $SD=2.50$), $p<.001$ and retrospective uncertainty ($M=7.66$; $SD=3.08$), $p<.001$; and retrospective uncertainty scored significantly higher than task uncertainty, $p=.029$. There were no significant differences between agencies in terms of their reasons for delay for task uncertainty, $\chi^2=2.41$, $p=.299$, outcome uncertainty, $F=1.29$, $p=.283$, or retrospective uncertainty, $\chi^2=.590$, $p=.745$. All three agencies scored outcome uncertainty significantly higher

than both retrospective and task uncertainty (Figure 7.1). This interaction was significant for the PS ($F(2,16)=55.460$, $p<.001$ with a large effect size $r=.776$), the FRS ($F(2,18)=42.626$, $p<.001$ with a large effect size $r=.703$), and the AS ($F(2,10)=37.282$, $p<.001$ with a large effect size $r=.789$).

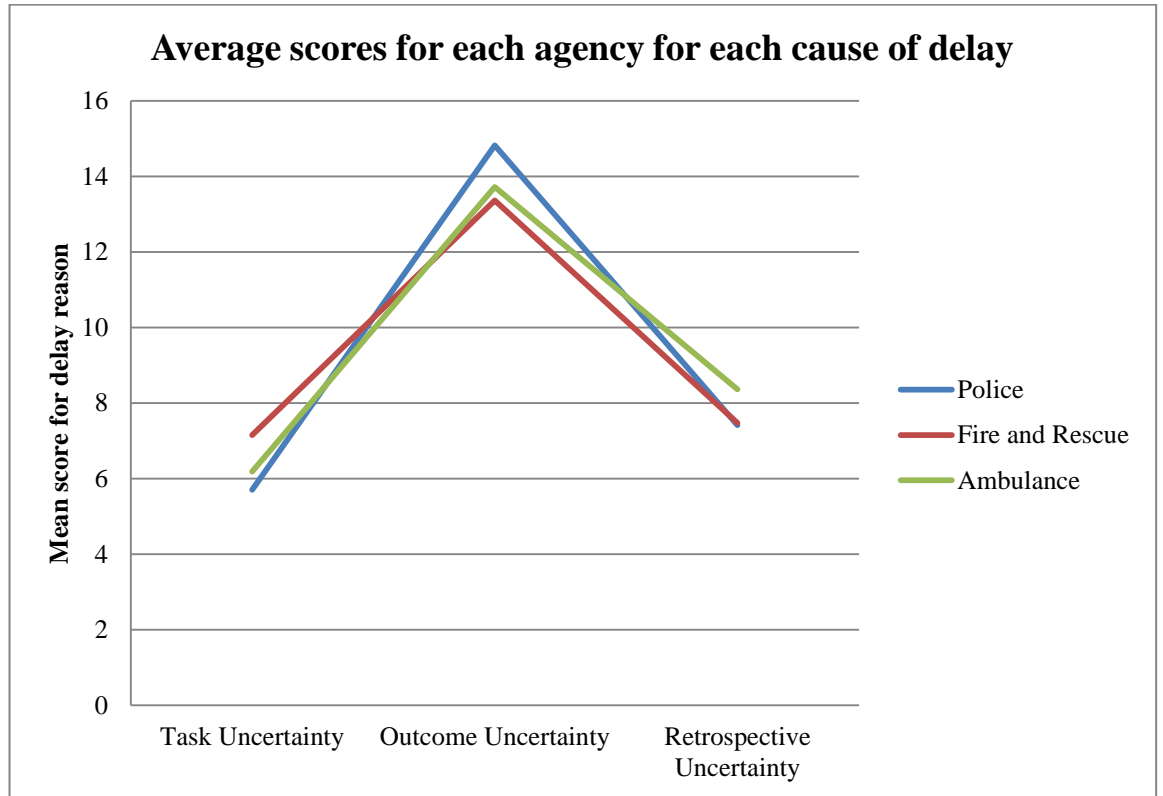


Figure 7.1: Participants' mean scores for task, outcome and retrospective uncertainty, split according to agency membership

As with Study 1, as the dependent variable of 'time' taken to log decisions was at the *team* level, the interaction between uncertainty and time taken to log decisions was explored at the team level using a majority rule (i.e. a majority rule was used to code teams as high/low on task/outcome/retrospective uncertainty). Pearson's chi-square analyses found that there were no significant associations between task uncertainty ($\chi^2=.915$, $p=.339$; $\chi^2=1.216$, $p=.270$; $\chi^2=.151$, $p=.698$), outcome uncertainty ($\chi^2=1.733$, $p=.188$; $\chi^2=.686$, $p=.407$; $\chi^2=.451$, $p=.502$) or retrospective uncertainty ($\chi^2=.420$, $p=.517$; $\chi^2=.192$, $p=.661$; $\chi^2=.032$, $p=.857$) and delays in overall decision making, the zoning task decision, or for the non-specialist staff decision, respectively.

7.4.3 H4: Those who score high on NFC and CF will experience lower levels of uncertainty

Participants also completed measures for differences in cognitive processing styles relating to the Need for Closure (NFC) scale and the Cognitive Flexibility Inventory (CFI). A Pearson's correlation found that NFC was *not* significantly correlated to task uncertainty, $\rho(47)=.112$, $p=.455$, outcome uncertainty, $r(47)=.024$, $p=.871$, or retrospective uncertainty, $\rho(47)=.015$, $p=.919$. CFI scores were also *not* correlated with task, $\rho(47)=-.062$, $p=.679$, outcome, $r(47)=.277$, $p=.059$ or retrospective uncertainty, $\rho(47)=-.038$, $p=.798$. However, the 'alternatives' and 'control' subscales of the CFI were significantly correlated. The 'alternatives' subscale of the CFI (which measures how many alternatives individuals tend to consider when faced with difficult choices) was *positively correlated* with *outcome uncertainty*, $r(47)=.329$, $p=.024$, and explained 10.8% of variance. In other words, those who tend to consider multiple alternatives when decision making showed increased uncertainty associated with outcomes. The 'control' subscale (which measures how much control individuals tend to perceive over difficult situations) was *negatively* correlated with both *task uncertainty*, $\rho(47)=-.382$, $p=.008$ (explained variance = 14.5%), and *retrospective uncertainty*, $r(47)=-.345$, $p=.017$ (explained variance = 11.90%). In other words, individuals who tend to feel that they *lack* control over difficult situations had higher task and retrospective uncertainty. This suggests that control was associated to *reduced* uncertainty (about tasks and the past), whereas the tendency to consider multiple alternatives was associated with *increased* uncertainty (about the future). This was further supported by a self-report item which measured whether participants believed they had delayed their decision making, as those with low (below median) scores for CFI-control were 9.48 times more likely to think they delayed their choices, $\chi^2=3.945$, $p=.047$, $\phi=.345$. Furthermore, those with high (above median) on CFI-alternatives were 1.29 times more likely to feel they delayed their choice, however these effects did not reach statistical significance, $\chi^2=.119$, $p=.730$, $\phi=-.051$.

7.5 Discussion

This chapter sought to explore the relationship between the experience of uncertainty and cognitive processing styles. Questionnaire data was used to explore

the different reasons for why participants may have delayed their decision making. A PCA revealed three types of uncertainty: (i) task uncertainty (concerning the characteristics of the task); (ii) outcome uncertainty (concerning anticipated potential future consequences); and (iii) retrospective uncertainty (concerning knowledge on roles and choices made in the past choices). Of these, outcome uncertainty was the highest scoring type of uncertainty. Different types of uncertainty were also related to individual differences in cognitive processing styles. Although no significant effects were found for NFC, the two sub-scales of the CFI had significant and opposing effects. High scores on the 'control' subscale was associated to lower (task; retrospective) uncertainty, whereas high scores on the 'alternatives' subscale was associated to higher (outcome) uncertainty. It is suggested that the time pressured nature of the emergency incident meant that the consideration of multiple alternatives was not useful; thus those high on CFI-alternatives anticipated more potential consequences leading to increased outcome uncertainty. Implications relating to the usefulness of different cognitive processing styles when operating in extreme environments will now be discussed.

7.5.1 H3 Discussion: Items in the questionnaire will reveal different types of uncertainty

It is acknowledged in the psychological literature that uncertainty in extreme environments is both prevalent and detrimental to action (Alison & Crego, 2007; Chen et al., 2008; van den Heuvel et al., 2014). The very nature of extreme environments places huge demands on the physical, psychological and interpersonal skills of decision makers (Orasanu & Liberman, 2011), which increases both stress and cognitive load (Drach-Zahavy & Erez, 1997; Paton & Flin, 1999). In addition, the response to emergency incidents is inherently led by teams, whereby emergency response commanders must not only operate at their own intra-team level but further coordinate with other agencies. This can add further uncertainty to the decision making environment when teams fail to effectively coordinate information and iteratively update their collective group processing (Hutchins & Kendall, 2011; Orasanu, 1994). As such, this study sought to unpack the experience of uncertainty during a simulated terrorist incident in order to explore whether there were any differences in the *types* of uncertainty. This could help to usefully identify whether

specific types of uncertainty may be more salient and thus especially detrimental to action.

It has been found that uncertainty in complex environments can be derived from endogenous sources, relating to task complexities, and exogenous sources, relating to the system being used to respond to the problem (Alison et al., 2014). The findings of this chapter differ in scope, as they categorise the *experience* of three different types of uncertainty rather than the source. In other words, endogenous or exogenous sources *contribute* to the experience of the different *types* of uncertainty. It was found that uncertainty could be separated into three types: (i) task uncertainty; (ii) outcome uncertainty; and (iii) retrospective uncertainty. These three types of uncertainty reflect uncertainty about three different aspects of the incident: one relating to the past (retrospective uncertainty); one relating to the present (task uncertainty); and one relating to the future (outcome uncertainty). It is suggested that all three types of uncertainty may be derived from both endogenous and exogenous sources. For example, ‘budget cuts and austerity measures’ were a salient *endogenous* source of uncertainty identified in Chapter 5, which appeared to increase task uncertainty in the present (e.g. unsure of availability of limited resources), outcome uncertainty about the future (e.g. unsure whether they can justify financial cost of response post-incident) and retrospective uncertainty about the past (e.g. unsure of who is responsible for which task following streamlining of organisation). This suggests that uncertainty is not merely an experience, but can be related to the past (retrospective), present (task) and the future (outcome). The relationship between experienced uncertainty and temporal focus offers an exciting possibility for future research.

Of the three types of uncertainty that were identified, it emerged that outcome uncertainty scored most highly across all participants from all three agencies. It is suggested that this is due to the detrimental impact of *negative* anticipatory thinking. When used appropriately, anticipatory thinking can *benefit* decision making as experts are able to ‘pattern match’ to anticipated future outcomes, ‘track trajectories’ by thinking ahead of the curve, and see ‘connections’ between current events and future states (Klein, Snowden & Lock Pin, 2011). Indeed, positive anticipatory thinking can facilitate goal-directed choice (Drach-Zahavy & Erez, 1997) as decision makers are able to envision how their actions may align with the achievement of

tactical and strategic goals. The visualisation of goals via mental imagery can improve task performance (Schultheiss & Brunstein, 1999). However, if anticipated outcomes are associated with negative outcomes, it is suggested that this cognitive process to visualise the future may become maladaptive. Indeed, anticipated negative consequences relating to both harm via action and harm via inaction were a key cause to maladaptive thinking identified in Chapter 4. Furthermore, research in emergency response domains has identified how the anticipation of potential negative outcomes relating to being held to account for poor decisions can reduce task performance; shifting focus away from task demands and towards more self-protective priorities (Waring, Alison, Cunningham & Whitfield, 2013). When individuals fear negative evaluation from others then ambiguity aversion increases (Curley, Yates & Abrams, 1986; Ellsberg, 1961); the anticipation of negative evaluation makes decision makers more risk averse in their decision making. However, if the fear of negative evaluation is removed, then performance improves (Trautmann, Vieider & Wakker, 2008). Thus, in linking these findings with previous data chapters in this thesis, it is possible that the competitive command team environment (as identified in Chapter 5) may negatively interact with social processing, increasing concerns on accountability and associated outcome uncertainty.

7.5.1.1 Implications for H3

Thus, a key implication of data, both from this chapter and general thesis, is the maladaptive impact of negative anticipatory thinking. This will be discussed in more detail in the ‘General Discussion’ (Chapter 8) to this thesis. It emerged in this study that ‘outcome uncertainty’ was the most prevalent type of uncertainty as experienced by commanders. This is somewhat contradictory to the current research on emergency response decision making, which highlights the salient negative impact of uncertainty about the current task and past decisions/knowledge (Chen et al., 2008). The added focus on the salient impact of *anticipated* negative outcomes is a fruitful avenue for further research. Furthermore, it may be possible to extend the findings on the three different types of uncertainty that were identified (i.e. task, outcome, retrospective). Specifically, research to explore how uncertainty and temporal focus interact with decision making is an interesting area for further research.

A limitation of the study is that there were only 50 participants involved and the questionnaire used to identify these three types of uncertainty only consisted of nine items. Future research could explore the model of temporal uncertainty by monitoring responses from a larger sample. It may also be useful to use these preliminary results to develop a more theoretically grounded psychometric scale that could be used to measure the experience of uncertainty during decision making more closely. In the present study, uncertainty was measured holistically at the end of the simulation. The development of a short psychometric scale could be useful for measuring the experience, and associated fluctuations, in uncertainty across the lifespan of a decision making/problem solving event. This is an exciting prospect for further research on a temporal model of uncertainty. It would also be interesting to see whether a temporal model of uncertainty extends beyond the domain of emergency incidents, or whether it is specific to time-pressured and high-stakes environments.

7.5.2 H4: Those who score high on NFC and CF will experience lower levels of uncertainty

H4 predicted that those who score high on NFC and CF would experience *less* uncertainty. This is because both of these measures are associated with adaptive and flexible cognitive processing under uncertainty (Kruglanski, et al., 1993; Dennis & Vander Wal, 2010). NFC is a cognitive processing trait whereby decision makers chronically limit their information processing in order to achieve rapid closure to decision tasks (Kruglanski, 1989; Webster & Kruglanski, 1994). It was anticipated that NFC would be an *adaptive* motivational mechanism that individuals use in order to cope with uncertainty. They would limit information search patterns in order to suppress uncertainty and increase decisiveness (Czernatowicz-Kukuczka et al., 2014; Kruglanski et al., 1993). It was thus hypothesised that those high on NFC would experience lower levels of uncertainty as they functionally suppress uncertainty and have greater confidence in their choices.

However, findings from the current study found no relationship between NFC and experienced uncertainty. This is counterintuitive to the general characteristics associated with NFC, as individuals tend to use attribute-search patterns that are adaptive for satisficing to minimum thresholds in complex decision environments

(Choi et al., 2008). In explaining this effect, it is possible that the sample used for this study (i.e. commanders) may all hold generally high scores on NFC as they are required to be decisive to succeed in a command role. Thus a lack of variability compared to the general population may have diluted findings. Furthermore, it is possible that, although those high on NFC are generally more decisive, that does not mean that they experience lower levels of uncertainty. Indeed, it has been found that those high on NFC will actually *increase* information search if tasks are complex making quick cognitive closure unlikely (Jasko, Czernatowicz-Kukuczka, Kossowska & Czarna, 2015). This means that those high on NFC will only reduce information processing if it aligns with the *functional* goal of closure (Kossowska & Bar-Tal, 2013); but when tasks are complex and uncertainty is high then they no longer adapt. It is therefore possible that NFC may be unrelated to uncertainty as it simply reflects a functional preference when decision making (i.e. quick closure), regardless of whether one is uncertain or not.

The second cognitive processing measure that this study explored was CF (Denis & Wander, 2013). CF is defined as the tendency to be flexible and adaptive in decision making (Martin & Anderson, 1998) and is generally perceived to be a positive cognitive processing trait that enables decision makers to think adaptively under stress (Dennis & Vander Wal, 2010). It is associated with self-awareness of alternatives, a willingness to adapt to changing circumstances and self-efficacy in one's ability to make flexible choices (Martin & Anderson, 1998). As such, it was expected that CF would be associated with a reduced uncertainty as individuals have confidence in their ability to control the situation by taking adaptive steps. Although overall scores on the CFI were unrelated to uncertainty, it appeared that the two subscales interacted with the experience of uncertainty. Interestingly however, it was found that the 'control' and 'alternatives' subscales of the CFI (Dennis & Vander Wal, 2010) had opposite effects.

Specifically, high scores on the 'control' subscale, which is associated to self-efficacy and perceived control over the ability to adapt to difficult situations, was associated with low scores on both task and retrospective uncertainty. This could be expected as individuals who feel in control of difficult situations would presumably experience less uncertainty about task requirements and past choices. Indeed, CF has been associated with constructive thinking (emotional intelligence), with individuals

perceiving difficult decision tasks as ‘challenging’ rather than a ‘threat’ (Drach-Zahavy & Somech, 1999; Epstein, 1998). This positive mental attitude when faced with difficult and ambiguous tasks has been used to explain why CF can increase one’s ability to adapt to situational demands (Santos-Ruiz et al., 2012). Arguably, those with high scores on CFI-control may experience lower task and retrospective uncertainty as they perceive ambiguity as challenging and manageable rather than threatening and derailing.

It also emerged that the ‘alternatives’ subscale of the CFI had a significant relationship with uncertainty, however that it was associated to *increased* outcome uncertainty. This is somewhat contradictory to the general perspective that CF is associated with positive affect and adaptive behaviour (Martin & Anderson, 1998) as it suggests that CF may *increase* uncertainty. CF has been linked to an increase in behavioural ‘scripts’ when faced with complex tasks (Martin & Anderson, 1998), which would suggest that individuals hold a level of expertise that may facilitate positive anticipatory thinking about outcomes (Klein et al., 2011). Yet the results of this study suggest the opposite; that those who tend to consider multiple alternatives anticipated *negative* outcomes.

In explaining the negative interaction between CFI-alternatives and outcome uncertainty, it is important to consider whether the types of alternatives that commanders consider when operating in complex emergency environments are positive or negative. It is possible that the consideration of alternative solutions and explanations may increase uncertainty as individuals fear being held to account for poor decision outcomes (Curley et al., 1986; Trautmann et al., 2008; Waring et al., 2013). This may relate to the specific role of the decision makers who were involved in this study as commanders have salient responsibilities for decision outcomes. Rather than high scores on CFI-alternatives being associated to positive solutions, perhaps the sheer ambiguity of the task coupled with the responsibility and accountability of a commander led to increased uncertainty. Generally, CF is associated with positive affect leading to adaptive choice, especially when individuals are approach oriented (Liu & Wang, 2014). It is possible that when faced with potentially aversive and negative outcomes, as is characteristic to the high-stakes emergency response environment (Chen et al., 2008), that CF associated with alternatives induces negative affect leading to increased outcome uncertainty.

Indeed, the vast majority of studies on CF tend to treat the measure as a holistic concept whereby perceived control and the consideration of alternatives are *adaptive* to decision making (Dennis & Vander Wal, 2010). However, it is possible that high scores on both these subscales may not always benefit choice depending upon the *context* of the choice environment. The consideration of multiple alternatives when operating in a high-stakes, complex and stressful environments may negatively impact choice leading to increased outcome uncertainty.

7.5.2.1 Implications for H4

Implications for the findings on individual differences in cognitive processing relate to the importance of decision *context*. CF was paradoxically both a help and a hindrance to decision making, with ‘control’ associated to reduced uncertainty and ‘alternatives’ associated to increased uncertainty. In order to explore why these contradictory effects arose, it would be interesting to see whether these findings hold in different decision making contexts. For example, it is possible that high scores on CFI-alternatives may be more useful in situations of low time-pressure and complexity. Indeed the consideration of alternatives in these settings may increase confidence in one’s choice by maximising outcomes; thus reducing outcome uncertainty. It would be interesting to see how CF scores interact with the characteristics of the decision problem.

Furthermore, this study measured differences in cognitive processing styles based upon trait individual differences. This was because the more implicit monitoring of cognitive processing styles to compare, for example, alternative- and attribute-based processing was unfeasible as such studies tend to use eye-gaze or mouse clicking trajectories on computers to identify how participants gathered information and compared options (e.g. Patalano & Wengrovitz, 2007). This was not possible in the current study, as participants had to generate solutions (rather than pick between options) and importantly because the purpose of the simulation was to reflect real-world choices and thus eye-tracking was unrealistic. Future studies could better extrapolate the relationship between cognitive processing styles and the experience of uncertainty by asking participants to log their decision and then list alternative options that they considered. This could be used as a measure of cognitive processing; whereby multiple alternative options suggests they were trying to

‘maximise’ outcomes whereas fewer alternatives indicates a ‘satisficing’ technique. This would offer a measure of adaptive cognitive processing that could be compared to the experience of uncertainty.

7.6 Conclusion

This chapter sought to test the relationship between uncertainty and cognitive processing styles in extreme environments, using questionnaire data following an immersive MTFA simulation exercise. A PCA identified three types of uncertainty associated to: (i) the task; (ii) outcomes; and (iii) past information/decisions. Of these, outcome uncertainty was the most prevalent. Individual differences in cognitive processing styles were associated with different experiences of uncertainty; CF associated with feelings of control was associated to lower scores on task and retrospective uncertainty, whereas CF associated with the consideration of multiple alternatives was associated to *increased* outcome uncertainty. It is suggested that this is due to a functional mismatch between the (usually adaptive) process of considering multiple alternatives and the characteristics of the emergency. In situations of time-pressure and complexity the consideration of alternatives may negatively interact with choice, leading to increased anticipated negative outcomes. As will be discussed in the general discussion (Chapter 8), the implications of these findings relate to the need to ensure that emergency service training emphasises the contextual relevance of cognitive flexibility with relation to the time demands. It is suggested that an increased awareness of the complex and/or time pressured nature of the decision task may facilitate decision making, as commanders can explicitly adapt their cognitive processing style to respond to time pressure. This may offer a fruitful way to reduce anticipated negative consequences, as commanders can rationalise the choices by acknowledging their need to satisfice to time pressure.

Chapter 8: General discussion

8.1 Introduction

The aim of this thesis was to make a novel contribution to psychology by extending upon the limited research on the psychology of inaction; specifically focussing on extreme decision making in emergency service contexts. It took a mixed methods approach, using both qualitative methods (to explore the *experiences* of practitioners when faced with challenging incidents) and quantitative methods (to *test* theoretical models). The central contribution of this thesis was to: (i) highlight the conceptual importance of research on stimulus and non-response; and (ii) identify some the causes of decision inertia in emergency response team settings. There were two key findings. Firstly, that the relationship between stimulus and non-response appears to be *mediated* by anticipated negative consequences; decision makers fail to take action because they were distracted by the anticipation of negative consequences linked to both action / approach and inaction / avoidance behaviour. Secondly, with regards to decision making in extreme environments, it appeared that certain cognitive processing styles (i.e. approach goals, cognitive flexibility) that are usually perceived to be adaptive were incompatible with the context of the emergency incident (i.e. time pressure, complexity); decision makers failed to take action as they did not adapt their cognitive processing in line with the time-pressured nature of extreme environments. This chapter will discuss these findings by:

- (i) Outlining the conceptual importance of psychological research on decision inertia.
- (ii) Discussing the two central findings in detail along with their implications, with regards to:
 - a. The mediating impact of anticipated negative consequences.
 - b. How some (usually adaptive) cognitive processing styles are inappropriate in the context of extreme environments.
- (iii) Identify the methodological strengths and weaknesses and recommendations for future research.

8.2 The conceptual importance of psychological research on decision inertia

This thesis began by highlighting an important, real-world issue with conceptual importance to psychology. It described a number of examples of how decision making at emergency incidents is often characterised by decision delays or failures to act. The Boxing Day Tsunami (2004), the Haiti Earthquake (2010) and the recurring flooding disasters in the UK over recent years all provide exemplars for how failures to act have drastic negative consequences (Campbell et al., 2008; Grunewald et al., 2010; National Audit Office, 2006; PEDU, 2012). This thesis explored why action sometimes fails by first identifying the psychological concept of ‘decision inertia’: the cognitive process of continual, yet fundamentally redundant, deliberation on a choice for no positive gain. Chapter 3 described how decision inertia is conceptually distinct from the concept of ‘decision avoidance’, whereby decision makers *intend* to avoid making a choice, and ‘implementation failure’, when a choice is made but fails to progress to behavioural execution due to breakdowns in coordination. Decision inertia is associated with strong *intentions* to take action, but action is prevented by the competing desire to also *avoid* potential negative consequences. The anticipation of negative consequences *mediates* the relationship between stimulus and non-response as individuals fail to act as they try to trade-off competing aversive outcomes.

Psychological research has developed expertise in understanding the linkage between the environment, behaviour and human cognition by experimenting on and observing the relationship between stimulus and response. There are a variety of paradigms in the decision making research domain that explore the conditions under which individuals make certain choices. For example, research on heuristics and biases has identified stimuli associated with irrational choice (Tversky & Kahneman, 1979) and NDM research has explored the factors associated to choice implementation ‘in the wild’ (Gore, Banks, Millward & Kyraikidou, 2006; McAndrew & Gore, 2015). Yet there has been relatively limited attention paid to the relationship between stimulus and *non-response*. Despite this, failures to make decisions are prevalent in human psychology as outlined in the real-world examples above. It is hoped that by highlighting the conceptual importance of the psychology of non-behaviour, that this could spark a fruitful and methodologically intriguing

avenue for further research, not only in the domain of decision making but with reference to the whole spectrum of human behaviour.

8.2.1 A summary of findings on the contributing factors to decision inertia

As the concept of inertia is relatively novel, an important first step to this thesis was to survey the available literature relating to the issue. A ‘critical interpretive synthesis’ method was used to survey the literature, as it specifically seeks to explore *new* and *novel* concepts by synthesising qualitative and quantitative literature whilst *interpreting* findings through a theoretical lens (Dixon-woods et al., 2005; 2006; Flemming, 2009). The result of this was a ‘taxonomy of action failure’, which identified how action may fail as a result of decision inertia, decision avoidance or implementation failure. It further proposed six theoretical causes to inaction: (i) task ambiguity; (ii) social ambiguity; (iii) inexperience in the decision domain; (iv) negative affect; (v) indecisive personalities; and (vi) avoidant goals and motivation. This taxonomy provided the context against which subsequent data chapters for this thesis were based. Table 8.1 outline thesis findings relate with these theorised causes: Chapter 4 found support of the negative effects of social ambiguity, negative affect and avoidant goals; Chapter 5 explored the influence of task ambiguity and social ambiguity; Chapter 6 identified how task ambiguity, social ambiguity and avoidant goals interact with inertia; and Chapter 7 unpacked the negative effects of task ambiguity, social ambiguity, indecisive personalities and avoidant goals. The one aspect that this thesis did not explore was the influence of experience / expertise on inaction. This was because the individuals involved in the research were all experienced commanders (in order to facilitate the desire for metacognitive descriptions of decision making) and thus a comparison to novice decision makers was not possible.

Table 8.1: Findings from each chapter with reference to the causes to uncertainty

Cause of inaction	C4: Qualitative goals and motivations	C5: Qualitative uncertainty	C6: Simulation goals and motivations	C7: Simulation uncertainty
Task ambiguity	-	Information; resources; time pressure; social management; budget cuts	Complexity of incident made approach goals maladaptive	Complexity of incident induced task uncertainty
Social ambiguity	Inconsistent goals between agencies	Communication s; role understanding; trust; competition	Inconsistent goals between agencies	Poor role understanding related to retrospective uncertainty
Inexperience in decision domain	-	-	-	-
Negative affect	Negative affect due to anticipated negative consequences	-	-	-
Indecisive personalities	-	-	-	Low control associated ot increased task and retrospective uncertainty; Cognitive flexibility can increase outcome uncertainty
Avoidant goals and motivation	Conflict between approach and avoidance goals	-	Avoidance goals delayed early choice	X

In terms of the specific negative effects of each of these causes, it emerged from the research of this thesis that *task ambiguity* was related to inaction due to issues with information, resources, time pressure, social management and budget cuts. Specifically, it derailed choice as added complexity increased task uncertainty and further reduced the functionality of approach goals. *Social ambiguity* was related to inaction due to issues with communication, role understanding, trust and competition. It appeared to derail choice as goals between agencies were inconsistent and poorly understood relating to retrospective uncertainty. *Negative affect* was a further contributing factor to inaction, as the desire to avoid potentially negative

outcomes was associated to anxiety. *Indecisive personalities* also interacted with inaction, as low scores on perceived control were associated with increased task and retrospective uncertainty; whereas high scores on cognitive flexibility-alternatives increased outcome uncertainty. Finally, it emerged that *avoidance goals* were associated with inaction and delayed choice, especially when being traded off against approach oriented intentions. As will now be discussed, it is suggested that the anticipation of negative consequences mediates the relationship between these causes to inaction and non-behaviour. A further important finding was that the *context* of the emergency incident had unusual effects on the functionality on goal orientations and cognitive processing styles and thus is an important moderator of the these effects. Each will now be discussed in more detail.

8.3 Two main findings

8.3.1 The mediating impact of anticipated negative consequences

The four data chapters to this thesis produced two main findings. The first of these related to the salient influence that the anticipation of negative consequences had on the ability to make decisions. It emerged that the relationship between stimulus and non-response was mediated by redundant deliberation in the attempt to trade-off negative anticipated consequences. It is well acknowledged that uncertainty can derail choice implementation in emergency incidents and extreme environments (van den Heuvel, Alison & Crego, 2012). The results of this thesis contribute to the understanding of *why* uncertainty may derail choice. Specifically, the anticipation of potential negative consequences was related to anxiety about violating approach and avoidance goals. For example, should I take action to ‘save life’ even if it may potentially violate ‘prevent harm’ goals by risking emergency responder safety; or should I take action to ‘prevent harm’ by taking cautious actions even if this may slow down action and thus violate ‘save life’? Indeed, not only was this goal conflict affiliated to forward thinking apparent in qualitative data chapters, but it also emerged that ‘outcome uncertainty’ was the most prevalent all types of uncertainty during the simulation. Figure 8.1 (discussed in detail in Chapter 4) provides a visual depiction of the anticipated negative consequences that participants from the emergency services described. It identifies how the anticipation of both short-term

(incident related) and long-term (post-incident) negative consequences derailed action and was associated to anxiety about causing harm via action and inaction.

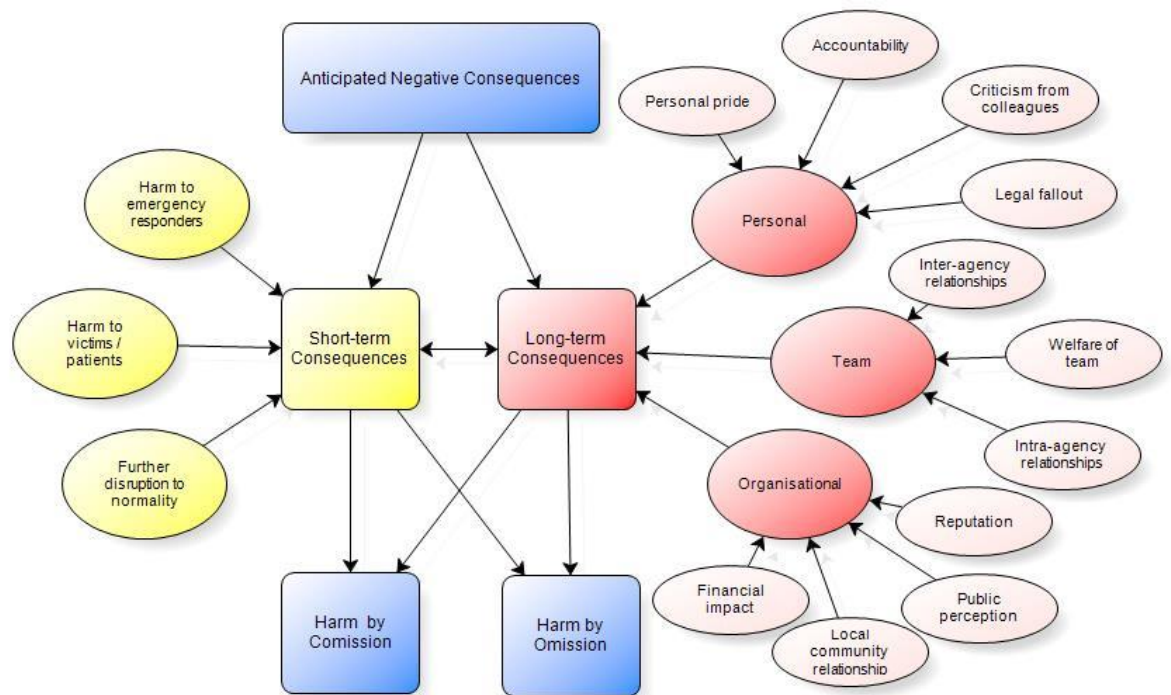


Figure 8.1: Anticipated negative consequences associated with decision inertia

Anticipated negative emotions, such as *regret*, can impede decision making as individuals focus on avoiding potential negative outcomes in place of rational decision outcomes (Brooks, 2011; Kumar, 2004; Murali, Pons & Hassay, 2011; Ritov & Baron, 1995; Tyocinski, Pitmann & Tuttle, 1995). Interestingly, it was found that anticipated negative outcomes were not only associated to causing harm by making a poor decision, but were also related to causing harm by failing to take any action at all. This links to previous research that has suggested there are two types of anticipated regret; one attached to regret from taking action (commission) and one linked to fear of regret following inaction (omission) (Sevdalis, Harvey & Yip, 2006). The distinction between these two types of regret has been used to explain the concept of ‘inaction inertia’, when individuals fail to take action after missing a previous *better* opportunity (e.g. missing out on a ‘sale’ price) (Tykocinski, Pittman & Tuttle, 1995). It is suggested that individuals fail to take action after a missed opportunity as they fear regret associated to negative counterfactual thinking about the previously missed opportunity (Sevdalis et al.,

2006). When operating in complex emergency domains whereby the situation changes rapidly, it is possible that missed opportunities to previously act may contribute to decision inertia.

In addition to regret, the anticipation of future blame and guilt can interfere with decision making, especially when operating in social/organisational settings whereby one needs to *justify* their choice (Eyre et al., 2008; Baron, 1992). Individuals fail to take action as they anticipate potential negative accountability in the future. A fear of accountability may explain why commanders sometimes fail to make decisions, as they trade-off potential negative consequences associated to future accountability. The requirement to justify one's actions to the team, superiors and the wider public as a part of the role of a commander thus impedes decision making. Indeed, accountability has been associated with an increased desire for self-preservation in police decision making contexts (Waring et al., 2012). Furthermore, in high-level healthcare decision making, managers struggle to make ethical choices due to feelings of isolation and exposure linked to accountability (Mamhidir, Kihlgren & Sorlie, 2007). The anticipation of negative consequences associated with accountability may thus reflect a salient explanation for decision inertia.

Not only do anticipated negative consequences interfere with decision making at the explicit level, but they are further linked to implicit cognitive biases such as omission bias. Omission bias describes how individuals' decision making is biased as they will consistently favour options that involve no action or no change when faced with potential negative outcomes (Ritov & Baron, 1995). This is because harm due to omission (inaction) is (irrationally) perceived to be less aversive than the potential for harm through commission (action) (Anderson, 2003). It is possible that omission bias may play a role in explaining decision inertia. Decision makers perceive *less* harm from omission than they do from commission and so favour inaction over action. Omission bias has been used to explain why some parents irrationally opt out from vaccinating their children, as even though the child is statistically safer having been vaccinated against a deadly disease, parents anticipate the (minimal) chance of negative side-effects as more aversive (Asch, Baron, Hershey et al., 1994; Bond & Nolan, 2011; DiBonaventura & Chapman, 2008). Furthermore, when faced with life-or-death moral choices, which are typical to emergency incidents, individuals tend to favour deontological protected values

which avoid causing harm through action (i.e. ‘do not kill’) even when this violates wider strategic goals (Bartels & Medin, 2007; Ritov & Baron, 1999). For example, when faced with the decision on whether to take action to risk one life in order to save many, individuals consistently refuse to take action even though it is the most rational choice. Fundamentally, in risky decision making environments where individuals anticipate regret, they tend to be biased towards options that, irrespective of normative standards, allow them to avoid taking action. This may help to explain the psychological reasons for why commanders struggled to commit to action when operating in inherently high risk emergency contexts; due to the salient aversive outcomes associated with action.

Crucially, although concepts such as omission bias and inaction inertia are well-studied phenomena that relate to *inaction*, these concepts do not necessarily relate to *decision inertia*. Many of the decision problems outlined above do not describe *inert* choice or redundant cognitive processing, but reflect active choices to ‘not take action’. What was found in the research described in this thesis was that, rather than commanders *choosing* to not take action, they instead experienced *cognitive conflict* associated with the redundant deliberation on *whether* they ‘do or don’t’ act. It is possible that this is a product of their organisational responsibilities and role to take action in order to ‘save life’. Commanders within the emergency services rarely have the luxury to ‘do nothing’ as their core responsibility and purpose is to take action to resolve the emergency incident. Indeed, when individuals’ anticipate that negative consequences may arise following *inaction* then this can induce an action bias, making decision makers *more* likely to act in order to avoid anticipated negative consequences for not acting (Tanner, 2009; Wroe, Turner & Salkoyskis, 2004). Furthermore, in moral life-or-death choices, when utilitarian values such as ‘save life’ are made salient to decision makers (over deontological ‘do not kill’ values), then individuals are *more* likely to favour the normative utilitarian option (i.e. take action that may harm a few to save many) (Broeders, van den Bos, Muller & Ham, 2011). These studies would suggest that when the anticipation of negative consequences is linked to inaction, then this may act to galvanise behavioural action.

A unique aspect of this research therefore relates to the finding that action failed despite the *motivation* of commanders to take action. Motivation is the energy that directs behaviour in line with emotions (feelings) and cognitions (goals) (Elliot,

2006). Commanders' primary *approach* goal was to 'save life' by taking *positive* action in order to *benefit* the emergency incident (Gray & McNaughton, 2000). According to the literature, it could be assumed that holding approach goals to 'save life' should de-bias cognitive processing associated with omission bias and galvanise action (Broeders, et al., 2011; Tanner, 2009; Wroe, et al., 2004). Indeed, data from the qualitative interviews suggested that commanders anticipated negative consequences for not acting, which supports this hypothesis. Yet, crucially, it was found that commanders not only anticipated salient negative consequences for violating 'save life' goals, but they further anticipated negative consequences linked to 'prevent further harm' goals. Unlike previous research, which has suggested that individuals are biased in favour of deontological or inactive goals (Bartels & Medin, 2007; Ritov & Baron, 1999), commanders experienced salient goal conflict due to their inability to trade-off competing and contradictory goals. Commanders held *both* approach goals to make a positive impact on the situation, along with avoidance goals to avoid taking action that may be of detriment to the emergency incident (Gray & McNaughton, 2000). Indeed, commanders have organisational responsibilities to both 'save life' and 'reduce harm' (JESIP, 2013); conflict arose when actions to 'save life' could inadvertently *increase* harm through, for example, causing harm to emergency respondents. It was this core goal conflict that derailed action, as commanders struggled to trade off competing anticipated negative consequences affiliated to both action and inaction.

8.3.1.1 Research implications for the mediating impact of anticipated negative consequences on decision inertia

The anticipation of negative consequences thus appeared to mediate the relationship between the causes of uncertainty and the failure to take action. Importantly, commanders, as a function of their role in the emergency services, not only anticipated potential negative consequences from taking action but also for not taking action, which induced redundant deliberation and inertia. These findings have important implications for research to more explicitly test this relationship. As this thesis took an NDM approach, using qualitative methods to explore the experience of expert commanders from *real-world* data, the potential to utilise more stringent statistical tools was limited. A strength of this method is the ability to discover novel concepts; for example, the discovery that anticipated negative consequences appear

to mediate the relationship between uncertainty and decision inertia is evidence of this methodological power. However, once theoretical hypotheses have emerged, it would be remittent of scientific research to not further test falsifiable conclusions (Popper, 2005). Chapter 7 identified that ‘outcome uncertainty’ was the most prevalent type of uncertainty experienced by commanders during the scenario, which links to anticipated negative consequences. Although the questionnaire scale that was developed in this thesis had three items to measure the latent variable of ‘outcome uncertainty’, further research could extend this scale. A validated scale would be useful for ‘in vivo’ tests to measure fluctuations in anticipated negative consequences across a decision making task. This could usefully identify *when* outcome uncertainty is most salient, in order to develop targeted training and/or interventions to reduce it.

A second implication for research on the negative impact of anticipated consequences relates to neurobiological research. It emerged that conflict between anticipated negative consequences were associated to competition between *approach* and *avoidance* goals (Bossuyt, Moors & De Houwer, 2014). As the concept of approach / avoidance motivation was derived from neurobiological research (Elliot, 2006; Gray, 1990; Gray & McNaughton, 2000), it is suggested that there may also be a neurobiological basis to decision inertia. Indeed, approach-avoidance conflict was associated with activation in the septo-hippocampul area of the brain; with *approach* goals associated with activation the Behavioural Approach System (BAS) and *avoidance* goals associated with activation in the Behavioural Inhibition System (BIS) (Gray & McNaughton, 2000). It would be interesting to conduct studies on decision inertia that monitor activation in the septo-hippocampul region of the brain when faced with high-stakes choices. It is possible that the experience of decision inertia may similarly activate the BIS and BAS areas of the brain. Furthermore, as it has been found that individual differences can arise in terms of BIS / BAS sensitivity (Carver & White, 1994), there may be individual differences in susceptibility to inertia. Research combing inertia and neurobiology could also provide a greater understanding of emotional processing in extreme environments. Indeed, neurobiological research embraces the role of emotions as a salient marker to guide the decision process (Damasio, 1994’ Gray & McNaughton, 2000); whereas organisational research and training tends to focus more on cognitive strategies and

rationalisations that may enable choice. Research on the neurobiological basis of inertia might promote research interest on the emotional basis of decision making in high-stakes organisations such as the emergency services.

8.3.1.2 Practical implications for the mediating impact of anticipated negative consequences on decision inertia

There are also a number of practical implications for the emergency services that can be derived from these results. Commanders expressed salient feelings of ‘responsibility as a commander’ and a ‘professional integrity’, which seemed to exacerbate their fear of negative anticipated consequences, both with regards to personal and organisational accountability. They felt responsible for having a positive impact on the emergency, yet positive affirmations were sometimes lost in the fear of failure. It has been found that, although egocentric goals in multi-team settings degrade performance (Kleingeld, Mierlo & Arends, 2011), that complexity in the decision environment can increase one’s focus on intra- rather than inter-agency goals (Alison, Power, et al., 2015). Furthermore, a fear of accountability can increase actions that are oriented around self-preservation (Waring et al., 2014) with inter-agency work tending to be less effective if there is a strong intra-agency occupational culture (Charman, 2012). This means that anxiety about potential negative outcomes may threaten the aim of JESIP to establish *joint* working (JESIP, 2013); the inherent risk associated with emergency incidents encourages within-organisation self-preservation. This raises an important question as to whether a truly interoperable emergency service is possible.

Chapter 6 identified how, despite commanders *stating* that goals were aligned between agencies, that in reality they were very different. Their self-reported goals were closely linked to agency-specific responsibilities; yet they assumed all team members were working towards the same goals as themselves. This creates concerns over the practical relevance of ‘joint’ working with regards to whether it is possible or desirable. Rather than a focus on *joint* work, perhaps it would be more appropriate to develop training that facilitates an understanding of the inter-team network, enshrining a decentralised approach to operations over a centralised desire for collective choice (House, Power & Alison, 2013). This could reduce the desire to protect oneself and one’s organisation, as it designates autonomy to each agency.

That is not to say that actions should be counter-intuitive to one another, but a clear delineation of each agency's expertise may facilitate work towards common goals, whilst reducing a desire to protect one's own agency from inter-team competition. The aim of JESIP to improve inter-agency role clarity can benefit inter-agency working by increasing awareness of each other's' specific capabilities within the wider-team system (Charman, 2012). Thus, rather than focus on *joint* decision making, which may inadvertently increase competition and egocentric actions, it may be more useful to develop a shared understanding of agency-specific roles; which could in turn reduce the anxiety associated to anticipated negative consequences related to inertia. It is recommended, rather than strive towards joint decision making, that future training in multi-agency settings should focus on developing a decentralised and metacognitive team network whereby there is a clear understanding of specific roles and expertise (Klein & Militello, 2004). This would help to reduce anticipated negative consequences associated with accountability and competition and facilitate cohesive action.

8.3.2 How some (usually adaptive) cognitive processing styles are inappropriate in the context of extreme environments

The second major finding from this thesis related to the importance of *context* when exploring the data. It was found that certain cognitive processing styles, which are usually perceived to facilitate decision making (i.e. approach goals; cognitive flexibility), negatively interacted with choice implementation. Generally, *approach* goals have a *positive* effect on choice implementation as they are associated to positive affect and the intention and motivation to take action by moving towards positive stimuli (Carver & White, 1994; Elliot, 2006). Similarly, 'cognitive flexibility' (CF), defined as "*the ability to switch cognitive sets to adapt to changing environmental stimuli*" (p.242, Dennis & Vander Wal, 2010) is associated with flexible cognitive processing patterns (Martin & Anderson, 1998) and the ability to think adaptively under stress (Dennis & Vander Wal, 2010). Both CF and approach motivations thus enable resilient decision making, allowing individuals to manage the stress and negative affect that is inherently associated with emergency response domains. It could therefore be assumed that holding approach goals and scoring high for CF would reduce the risk of decision inertia.

Yet evidence derived from this thesis uncovered an unexpected relationship between cognitive processing styles and their decision making outputs. Although teams who were predominantly *approach* motivated made *faster* decisions initially (i.e. during the zoning decision task), they were significantly slower at decision making later on in the incident (i.e. during the ‘non-specialist staff’) decision. Furthermore, although CF associated with perceived control over difficult situations was associated to lower experiences of task and retrospective uncertainty, CF associated to the consideration of multiple alternatives *increased* outcome uncertainty. It is suggested that the reason for these unexpected and somewhat contradictory findings is due to the *context* of the emergency incident environment. Indeed, when incident complexity increases as a result of multiple task demands then approach goals are no longer functionally appropriate; commanders struggle to prioritise goals due to their overwhelming desire to maximise outcomes. Similarly, CF relating to the generation of multiple alternatives may be useful when operating in non-time pressured environments, yet when decisions are required rapidly it can impede choice as the consideration of multiple alternatives increases redundant deliberation and overall uncertainty about the future.

The influence of choice context on decision making has been well explored in the psychological literature. In emergency incidents, the environment is often described as being high-risk, high-stakes and time pressured (Chen et al., 2008). This impedes decision making performance by inducing cognitive overload and stress (Paton & Flin, 1999). As endogenous uncertainties are inherent to almost all decision making in extreme environments (Alison et al., 2014), it is important to try and find ways to overcome their effects. The development of expertise in the decision domain, following repeated opportunities to ‘learn’ within the decision environment, enables experts to make rapid decision based on little perceptual information (Klein, 1998). Experts are able to expedite the decision process through the automatic generation of the most appropriate option (Klein et al., 1995), which enables them to ‘leap’ or ‘shunt’ along the decision making process, thereby sidestepping more analytic evaluation of complex information (Salmon et al., 2010). Experience in the decision domain increases resilience against uncertainty when faced with novel situations, as experts utilise accurate heuristic processing mechanisms (such as ‘reflection-in-action’) in order to cope with uncertainty (van den Heuvel et al.,

2014). Furthermore, the development of ‘adaptive expertise’ enables experienced individuals in specialised domains to generate novel solutions to complex problems (Hatano & Inagaki, 1986). Fundamentally, decision making under uncertainty is enabled by using adaptive and relevant cognitive processing.

However, despite the ability to reduce uncertainty via the development of expertise, the very nature of emergency incidents means that commanders face a variety of different types of emergency that each present their own nuanced set of challenges. Commanders from different geographic regions across the UK will have different skill sets depending upon, for example, whether they live near water, in remote areas or urban areas. As the ability for commanders to develop expertise across a range of difference specialisms is both unfeasible and not necessarily useful, it is thus important to focus on building expertise in *adaptive decision making skills* that may be applied across incidents. Specifically, commanders may benefit from training to identify how different features of the environment (e.g. time pressure) require different cognitive processing strategies and decision rules. For example, approach goals may be useful for initial and relatively straight forward tasking (e.g. zoning task): the commanders had received initial basic information about the incident with their main task focussed on zoning. Yet when multiple task demands compete for attention, then approach goals are no longer useful: by the time ‘non-specialist responders’ had arrived and offered their assistance, commanders were also responding to an escalating fire, mobile terrorists in a new location, and a vast number of casualties who were critically injured. This meant that approach goals were no longer *functionally* adaptive as a result of the dynamic change in number of competing priorities. Approach motivations were in fact *maladaptive* when operating in contexts with mutual salient and competing goals (Orasanu & Connolly, 1993) due to increased cognitive overload and goal conflict, which is possibly linked to activation in the septo-hippocampus (Gray, 1990; Gray & McNaughton, 2000). Thus, although the desire to achieve positive outcomes provided a useful cognitive strategy in the early stages of the incident, it is important to more fully understand the conditions under which approach goals can paradoxically reduce action likelihood.

In explaining the possible reasons for *why* certain cognitive processing styles may be inappropriate in extreme environments, it is possibly due to the association

between approach goals and ‘maximising’ outcomes. The desire to ‘maximise’ one’s outcomes is associated with highly selective ‘alternative-based’ cognitive processing, which aims to identify *if* any options are good enough (Patalano & Wengrovitz, 2007). This contrasts to ‘satisficing’, which is associated to attribute-based evaluation using minimum thresholds to establish *which* option is good enough (Patalano & Wengrovitz, 2007). Likewise, it is possible that high scores on CF-alternatives is associated to ‘maximising’ as individuals consider multiple options. Maximising strategies are most appropriate when decisions are non-time bounded and/or have the potential to be deferred; whereas satisficing is useful in time pressured domains (Parker & Schrift, 2011). Indeed, when placed under time pressure, it was found that police officers expertly adapted their processing styles to use satisficing techniques, yet this effect was moderated by individual differences in trait ‘time urgency’ (Alison, Doran et al., 2013). In other words, individuals who had a trait tendency to perceive time to pass more slowly did *not* adjust to time pressure by satisficing. It is possible that the findings of Chapter 7, which linked CFI-alternatives with high outcome uncertainty, may be similarly explained; that scores on CFI-alternatives moderate the ability for individuals to adapt to the choice context. Those with high CFI-alternative scores chronically maximise decision making and thus are less likely to adapt to time pressure. This offers a fruitful and exciting avenue for further research on the relationship between choice context, cognitive processing tendencies and choice implementation.

8.3.2.1 Research implications for the interaction between cognitive processing styles and the context of extreme environments

The finding that approach goals and CF were not only related to adaptive decision making but also related to negative choice outcomes under certain conditions was an unexpected finding. It is suggested that this is due to the functional mismatch between these cognitive processing styles and the *context* of extreme environments, whereby high-stakes, time-pressured environments with multiple competing tasks (Militello, et al., 2015) remove and reverse the usual functional benefits of approach goals and CF. These goals and cognitive processing styles may be useful, but only when they are functionally compatible with the demands of the decision task. An important first implication to these findings is to investigate conclusions more explicitly. A limitation with the current data is that

results emerged somewhat unexpectedly and so explicit testing of these effects was not incorporated into the study design (e.g. in questionnaires). Furthermore, due to the requirements for the simulation to facilitate both research and training needs, ‘in vivo’ measurements of goals and uncertainty were not possible as it would have reduced the immersive quality of the exercise. The current study relied on post-simulation measures of goals and uncertainty. Future research could develop these findings by using ‘in vivo’ measurements on goal orientations and experienced uncertainty to see how they fluctuate over the course of the incident and relate to decision timeliness. For example, the same exercise could be run again, but when asking participants to ‘log’ their decisions also ask them to fill in a short questionnaire to identify their top goals and scores on the three uncertainty scales outlined in Chapter 7.

It would also be interesting to explore the relationship between individual differences and the ability to adapt to the situation. Although NFC had no significant effects in the current study, it has been previously found that NFC is linked to high sensitivity to the characteristics of the choice context (Jasko, Czernatowicz-Kukuczka, Kossowska & Czarna, 2015). Those high on NFC will adapt their behaviour in order to facilitate the functional goal of closure by either increasing or decreasing information search depending on whichever strategy will achieve closure the fastest (e.g. increase search in novel contexts as no prior knowledge to base a fast decision on). It is possible that, unlike NFC, those high on CFI-alternatives may be chronically oriented towards the consideration of multiple alternatives, regardless of whether it is useful for choice implementation in complex contexts. For example, are those who score high on CF-alternatives less able to adapt to time pressure as they continue to generate multiple hypotheses? Furthermore, how does this interact at a team level? It was not possible to manipulate the characteristics of team members in the current study to, for example, compare teams where all members scored high on CF-alternatives versus low on CF-alternatives, as they were a specialised sample who was only available on an opportunity basis. Perhaps, as this concept may be linked to more general psychology rather than the psychology of emergency services specifically, it would be possible to extend this to more general group processing whereby it would be possible to manipulate team characteristics using participants

from the general population. There is further scope to investigate these effects at the individual level.

8.3.2.2 Practical implications for the interaction between cognitive processing styles and the context of extreme environments

In terms of the practical relevance of findings, there are implications for training. Indeed, the usefulness of different decision making styles (i.e. goals, cognitive processing) appears to be moderated by the choice context. It is important that training on decision making in emergency settings acknowledges these effects. For instance, approach goals to maximise outcomes may be useful in relatively routine incidents, yet could degrade choice implementation in novel or highly time pressured incidents. It is important that commanders are aware of how the characteristics of the environment may interfere with certain processing styles. Indeed, research on police decision making suggested that experienced police officers were able to intuitively adapt their decision making to the choice environment, by ‘satisficing’ when placed under time pressure (Alison, Doran et al., 2013). However, it is important that an awareness of these factors is incorporated into training to increase awareness and further expedite the learning process when developing expertise. Indeed, although the emergency services undergo a great deal of training at a practical level, training on the psychological process of decision making is less advanced. An important recommendation of these findings is to extend decision making training in order to reduce decision inertia and improve overall response.

In order to make commanders more sensitive to the emergency incident environment, it is possible that training on the use of the ‘Introspect model’ may be beneficial. The ‘Introspect model’ is a framework to help guide the debriefing process after emergency incidents, whereby commanders work through their debrief in a structured manner in order to develop self-reflective knowledge and metacognition about the situation (Lamb, Davies, Bowley & Williams, 2014). The ‘Introspect model’ has been successfully used in UK Fire and Rescue settings and can facilitate decision making by translating a commander’s unconscious competence into conscious awareness (Lamb et al., 2014). This would help to make commanders more aware of their intuitive adaptation to extreme environments (e.g. by satisficing to time pressure), which will help them to more easily recognise these

cues in future incidents. It is also possible that commanders may be trained to become more *sensitive* to the characteristics of the decision environment. Stress exposure training (Driskell & Johnston, 1998) can help commanders to identify ‘stressful’ factors in the choice environment and adapt their behaviour. This could usefully supplement training using the ‘Introspect model’ (Lamb et al., 2014) by training commander’s skills on perceptual abilities for sensemaking in extreme environments. Training using both the ‘Introspect model’ (Lamb et al., 2014) and stress exposure training (Driskell & Johnson, 1998) offers a fruitful way to educate commanders on how to adapt their decision making in complex settings. This could help them to recognise when they need to shift their processing towards more ‘satisficing’ techniques.

8.4 Methodological lessons and future direction

The final section of this discussion will explore the strengths and weakness of the chosen methodology for this thesis, and how this interacts with directions for future research. In terms of strengths, findings have high ecological validity to the domain of command-level decision making in the emergency services. By taking an NDM approach, the conclusions outlined throughout this thesis and highlighted in this discussion chapter can claim to have relevance to real-world choice. Data was initially collected by interviewing experts on their own personal experiences, utilising the CDM interview protocol to unpack metacognitive expertise on the main challenges to decision making (Crandall et al., 2006; Wong, 2003). This allowed for rigorous, sincere and credible conclusions to be drawn (Tracy, 2010), which is especially beneficial when conducting exploratory data that seeks to unpack knowledge on novel or underexplored concepts (i.e. decision inertia). Similarly, prior to data collection, a novel approach to reviewing the literature was conducted using the ‘critical interpretive synthesis’ process (Dixon-woods et al., 2005; 2006; Flemming, 2009). Once more, this methodology, although less well utilised than the likes of systematic literature reviews that utilise strict and limiting search criteria, is appropriate for the exploration of data in order to generate theoretical insights and emergent themes. Thus, a strength to the conclusions drawn from this thesis is their solid grounding to the data.

Yet, the methodological strengths of qualitative research are paradoxically an inherent weakness. Qualitative methods are often perceived as *less scientific* than more statistical procedures (Malterud, 2001) and there is a risk that the voluminous data that is produced from techniques such as interviews can overwhelm the researcher when trying to make sense of their findings (Liamputtong, 2009). Indeed, a limitation to the findings of this thesis is that data analyses were conducted by the author without the checks of ‘inter-rater reliability’ to ensure that similar conclusions would be derived by other researchers. One practical reason for this was related to the size of the data set: over 494,000 words were produced from the interview transcripts and so, due to the timeframe and the lack of availability of additional researchers, inter-rater reliability checks were not possible. However, a second interviewer was present during the interview process who helped to monitor the neutrality of interviews and reduce variability. Furthermore, the criticism levelled at qualitative data for being ‘unscientific’ is often associated to the lack of explicit and coherent guidance on how to utilise qualitative procedures (Malterud, 2001). This was overcome in this thesis by following guidelines specifically outlined for conducting critical interpretive syntheses (see Dixon-woods et al., 2005; 2006; Flemming, 2009); using the CDM protocol (see Crandall et al., 2006) and analysing the data with grounded theory (see Glaser & Strauss, 1965). Finally, and perhaps most importantly, as this thesis took an exploratory approach to investigate problem solving in the real-world, then this *required* the researcher to immerse themselves in the data to provide an informed perspective on the incredibly complex world of emergency responding. The preliminary work involved in attending training events and conversing with the emergency services in an informal manner thus strengthens conclusions by developing a ‘quasi-expert’ status to provide scientific yet informed conclusions (Pfadenhauer, 2009). Thus, although the exploratory and qualitative basis of conclusions may reflect a weakness to research, for the purposes of this thesis, it was an integral and required first step to generating an informed understanding of the concept of decision inertia in emergency response settings.

A further strength to this thesis was the supplemental testing of conclusions in more controlled settings. Chapters 6 and 7 describe data that was collected during an immersive simulation using the ‘Hydra’ system. Immersive simulated learning environments, such as Hydra, offer a unique platform for NDM research, by

facilitating practitioner-academic relationships and the opportunity to both train decision makers (practitioner goal) whilst offering a unique way to collect near-real-world data (Alison et al., 2013). As outlined in Chapter 2, not only is this beneficial in providing the opportunity to collect data in settings that are otherwise rarely accessible (i.e. major incidents) but, when conducted well, can provide a fruitful basis for future collaborative research to extend upon findings (Rosenbaum, 2010). For example, the success of the early CDM interviews facilitated positive engagement with practitioners for further collaboration during the simulations. However, collecting data in practitioner-research built simulations can also be a limitation. When the goals of a project are diverse, in that they seek to address both training and research, the ability to maintain goal focus during data collection is threatened (Seider et al., 2007). Furthermore, an important assumption when working with data collected from simulations is that they are credible with high fidelity to ensure that recorded behaviour is reflective of real-world patterns (Klein & Woods, 1993). When simulations seek to be highly *immersive* then it is important that this does not come at the cost of collecting scientific data. Indeed, Chapter 6 outlines the process that was used to overcome these limitations in more detail by, for example, close collaboration with subject matter experts and explicit identification of research and training goals. Yet these factors remain to be an acknowledged, yet hopefully addressed, methodological limitation.

A final methodological point when reflecting on the conclusions of this thesis relates to the generalizability to findings outside the domain of emergency service decision making. As identified earlier, the concept of ‘decision inertia’ was developed when reflecting on the numerous real-world examples of failures to take action following major emergencies (e.g. Haiti earthquake, Boxing Day tsunami). It was advanced over a number of years during various research projects that worked directly with the emergency services (for an example, see Alison et al., 2015). Thus, an important question to ask is whether decision inertia is specific to the domain of emergency responding or does it have wider application? Are the key characteristics of an emergency incident, as high-stakes, time pressured, complex and dynamic (Alison & Crego, 2007; Chen et al., 2008) unique features to this decision domain? Does decision inertia exist in organisational settings whereby decision making is, critical, but relatively slow-time over a period of days, weeks or months? Or is it a

more widespread psychological phenomenon that individuals may experience when faced with life-changing choices? For example, one may not be inert over a low-level decision on whether to go to the shops or not; yet may continually and redundantly deliberate over the decision on whether to have a child or not, albeit not at the same level of *constant* deliberation due to the lack of time limitations. Thus, a limitation to this study relates to the generalisation of findings outside the domain of emergency responding. This is an acknowledged limitation, but an equally exciting possibility for further research on this new and novel concept.

8.5 Final conclusion

This thesis sought to explore the novel concept of decision inertia in the domain of the emergency services. It took an NDM approach to research, using mixed methods to explore the problem using interviews with experienced commanders, and to test conclusions in a simulated environment. There were two main findings that were derived from this research. Firstly, anticipated negative consequences seemed to mediate the relationship between stimulus and non-response; commanders failed to take action as they traded-off competing anticipated negative outcomes. Secondly, at a more practical level, it was found that the complex nature of emergency incidents (e.g. time pressure, competing tasks) may limit the usefulness of certain cognitive processing strategies (i.e. approach goals; cognitive flexibility). The implications of these findings are twofold. In terms of psychological research, this thesis has highlighted the importance of exploring the relationship between stimulus and non-response which can inspire further investigation. In terms of practical recommendations to the emergency services, it is recommended that an increased focus on decision making training to make commanders more sensitive to the complex choice setting would be useful in order to facilitate adaptive cognitive processing. Overall, the central aim of this thesis was to engender psychological enquiry so that we can more fully understand not only why people make decisions, but importantly why, at times, actions can fail.

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Appendix One: Interview protocol and forms used for the CDM Interviews

Multi-agency commander interviews

Date	
Start Time	
Finish Time	
Agency	
Participant Identifying Code	
Consent form signed	

Descriptive Details

Sex: Male Female

Age: _____ Years

Job Title: _____

Years in Current Role: _____ Years _____ Months

Total Length of Service: _____ Years _____ Months

Main duties and Responsibilities:

Introduction

In this interview I will ask you about your experience as a command level decision maker in the Fire/Ambulance/Police service. In a minute I will outline the type of experience that I am interested in hearing about. Once we have picked an experience, we will work together in drawing up a timeline of this decision. I will then ask you some specific questions about the event to help me understand it in more detail and to support you in recalling your experience. Please take as much time as you need to respond and feel free to use the pen and paper provided to reflect or sketch something at any time during the interview. You are made aware that if you disclose to me anything that could be considered as dangerous practice from a real-life incident then I am obliged to pass this information on. Otherwise, any information that you do provide will be treated with the strictest confidence with all identifiable information about the incident and yourself removed from the final write-up of the report.

INCIDENT SELECTION	POSSIBLE INCIDENTS
<p>Initial probe: Tell me about a time when you acted in a multi-agency environment.</p> <p>Please try and think of an incident that you found:</p> <ul style="list-style-type: none">• Especially challenging• Joint decision making was difficult <p>The type of decision should have:</p> <ul style="list-style-type: none">• High consequences• Once made would be very difficult to reverse• Took a long time to make <p>Further probes:</p> <ul style="list-style-type: none">• About whether or not to commit to a certain action, tactic or strategy• It is a 'do or don't act' decision <p>Example decision: The decision to declare a major incident or not, or the decision to change your current course of action or not.</p>	

INCIDENT RECALL	
INSTRUCTION	This (selected event) sounds interesting. Could you please tell recount it in more detail from beginning to end?

INCIDENT RETELLING	
INSTRUCTION: Now I will read back your account. Please check the details as I do so to make sure that I've got it right and feel free to jump in and correct me or add in details that come to mind when I retell it.	
Corrections	Added details

DECISION POINT IDENTIFICATION

INSTRUCTIONS:

Now I'd like to go through the event again and this time we will create a timeline of the important parts of the event that led up to your difficult decision. This can include things that happened, what you saw, the decisions or judgements you made previously and the actions you took.

**OSA = Observation/ Situation Assessment
= Action**

D = Decision

A

TIME	EVENT	OSA, D, A

DEEPENING	
INSTRUCTIONS: Now I want to go through the incident again but this time we want to look at it in a little bit more detail. I'm going to guide you with some questions	
PROBE TOPIC	PROBE
Decision barriers/ Decision blocking/ Decision making	In your opinion what were the biggest barriers to your decision making on that day? What prevented interoperability? Was there any point when you found it difficult to process the information available? How much time pressure was involved in making this decision? How long did it take to reach the decision?
Cues/ Information/ Information integration/ Guidance	What were you looking at when you formulated your decision? How did you know that you needed to make the decision? How did you know when to make the decision? What information did you use in making your decision? How and where did you get this information? Who from? Did you seek more information or guidance from someone at this point? How did you know to trust the information/guidance you received? What was the most important piece of information that you used to formulate the decision? What did you do with this information? Did you use all the information available to you when formulating the decision?
Situation awareness/ assessment/ Options	If you had to describe the situation to someone else at this point, how would you summarize the situation? Was there any additional information that you would have liked to assist in the formulation of the decision? What other courses of action did you consider?
Basis of choice/ Standard scenarios/ Experience/ Standard operating procedures/ decision making	Why did you select/reject this course of action? What made you know that this was the right thing to do at this point in the incident? Were you following any standard rules or operating procedures? Does this case fit with a standard or typical scenario? Had you been trained to deal with this type of event? What specific training or experience helped you make this choice? Do you think that you could develop any rules which could assist another person to make the same decision successfully?
Goals/ priorities	What were your specific goals (objectives) at this time? What was the most important priority for you at this point in time?
Expectancy/ Mental Modelling	Did you imagine the possible consequences of your decision? What were they? Did you imagine how events may unfold because of your choice? Did you create a picture in your head? Were you expecting to have to make this type of decision during the incident?
Influence of uncertainty	At any stage, were you uncertain about either the reliability or the relevance of the information that you had available? At any stage, were you uncertain about the appropriateness of the decision?
Analogy/generalization	Were you reminded of any previous experiences? Were you at any time, reminded of previous experiences in which a <i>similar</i> decision was made? Were you at any time, reminded of previous experiences in which a <i>different</i> decision was made?

"WHAT IF?" PROBES		
INSTRUCTIONS: Now I want to go through the incident one more time, but this time I want to ask you some hypothetical questions		
PROBE TOPIC	PROBE	
Errors	How might a novice have behaved differently? What mistakes/errors are likely at this point?	
Conceptual model/ Hypotheticals	Can you describe a situation in which your decision would have turned out differently? Describe the nature of these situations and the characteristics that would have changed the outcome of your decision. If a key feature of the situation had been different, what difference would it have made in your decision?	
Aiding	If the decision was not the best, what training, knowledge or information could have helped?	
EVENT (OSA/D /A)	PROBE	RESPONSE

CLOSE OF INTERVEIW
INSTRUCTIONS: Thank you for talking to us today. Is there anything you would finally like to add?

Appendix Two: Critical Interpretive Synthesis Results Table

Appraisal and Extraction (within study)					Iterative synthesis
Reference	Aim/Topic	Method	Results	Second order constructs	Synthetic Constructs
SEARCH TERMS: 'Decision avoidance' OR 'Decision inertia'					
Anderson, C.J. (2003). The Psychology of doing nothing: forms of decision avoidance result from reason and emotion. <i>Psychological Bulletin</i> , 129, 139-167.	Rational-emotional model of decision avoidance	Qualitative – literature review	<ul style="list-style-type: none"> - 4 types of decision avoidance: <i>choice deferral</i>; <i>status quo bias</i>; <i>omission bias</i>; <i>inaction inertia</i> - Decision avoidance is caused by <i>rational</i> antecedents and <i>anticipatory and experienced emotions</i> which have NO direct effect but <i>accumulate</i> to cause avoidance 	<ul style="list-style-type: none"> - Choice deferral - Status quo bias - Omission bias - Inaction inertia - Emotions 	Task ambiguity Experienced emotions Anticipated emotions Decision Avoidance
Carmona, S., Iyer, G., & Reckers, P.M.J. (2011). The impact of strategy communications, incentives and national culture on scorecare implementation. <i>Advances in Accounting, incorporating Advances in International Accounting</i> , 27, 62-74.	Decision avoidance and competing options	Quantitative – empirical study (financial DM)	<ul style="list-style-type: none"> - Cultural factors influence avoidance - Individualist (vs collectivist) cultures more prone to avoid decision as they focus on short-term financial gains over bigger picture - Visual decision aids reduced avoidance and increased focus on long-term goals 	<ul style="list-style-type: none"> - Cultural differences - Visual decision aids - Temporal goal conflict 	Individual differences Goal conflict Decision inertia
Kumar, P. (2004). The effects of social comparison on inaction inertia. <i>Organizational Behavior and Human Decision Processes</i> , 95, 175-185.	Inaction inertia (II) in social groups	Quantitative – empirical study (consumer DM)	<ul style="list-style-type: none"> - II associated with relationship with social referent - Relationship with referent influences action = increased <i>regret</i> if dislike referent and they took the offer - II increased when close physical proximity to referent 	<ul style="list-style-type: none"> - Inaction inertia - Social comparison - Regret - Physical proximity 	Social ambiguity Experienced emotions Decision avoidance
Mamhidir, A.G., Kihlgren, M., & Sorlie, V. (2007). Ethical challenges related to elder care. High-level decision-makers' experiences. <i>BMC Medical Ethics</i> , 8 (3), 1-10.	Healthcare ethical decision making	Qualitative – Semi-structured interviews (high level healthcare workers)	<ul style="list-style-type: none"> - Ethical decision making more difficult as feel: exposed; alone; uncertain; lack of confirmation; at risk of being a scapegoat; hard to avoid decision; divided feelings (personal versus professional morals) 	<ul style="list-style-type: none"> - Negative Emotions - Uncertainty - Accountability - Personal/professional moral conflict 	Social ambiguity Experienced emotions Anticipated emotions Decision inertia
Thomas, A., Buboltz, W.C., Teague, S., Seemann, E.A. (2011). The Multidimensionality of the Desirability of Control Scale (Burger & Cooper, 1979). <i>Individual Differences Research</i> , 9 (3), 173-182.	Desirability of Control Scale (DOCS)	Quantitative – empirical study	<ul style="list-style-type: none"> - DOCS is a multidimensional construct that unpicks: leadership; decision avoidance; destiny control - DOCS suggest individual differences in these three constructs and so may be based on personality factors 	<ul style="list-style-type: none"> - Desire for control - Personality differences 	Individual differences Decision avoidance
White, C.M., H. S., Hoffrafe, U., Reisen, N., & Woike, J.K. (2011). Are groups more likely to defer choice than their members? <i>Judgement and Decision Making</i> , 6 (3), 239-251.	Decision avoidance in groups	Quantitative – reanalysed previous data (job candidate selection)	<ul style="list-style-type: none"> - Choice deferral more likely in group settings (42%) than individual (12%) - Possibly because: easier to defend omission; omission is hard to criticise (as has no attributes); prefer omission over (suboptimal) commission; only agreeable option as cannot come to collective choice; no one loses and so more favourable to the group - Implications on organisational decision making: <ul style="list-style-type: none"> o Some decisions (rapid) should be made by individual o Group decision making is at risk of delay 	<ul style="list-style-type: none"> - Choice deferral - Social loafing - Command Structure 	Social ambiguity Decision avoidance
"Implementation failure" AND "Decision making"					
Taleai, M., & Mansourian, A. (2008). Using Delphi-AHP Method to Survey Major Factors causing urban plan	Implementation failure in urban planning	Qualitative (Delphi method) and Quantitative	<ul style="list-style-type: none"> - Identified ten factors which caused implementation failure - Main four were: Lack of information; Poor organisational structure; Poor multi-agency interoperability; Ignorance of practical application 	<ul style="list-style-type: none"> - Implementation failure - Organisational 	Task ambiguity Social ambiguity Implementation failure

implementation failure. <i>Journal of Applied Sciences</i> , 8(15), 2746-2751.		(Analytic Hierarchy Process)		- structure - Uncertainty	
Decker, P., Durand, R., Mayfield, C.O., McCormack, C., Skinner, D., & Perdue, G. (2012). Predicting implementation failure in organization change. <i>Journal of Organizational Culture, Communications and Conflict</i> , 16(2), 39-59.	Implementation failure in organisations	Qualitative – literature review	- Identified 60 critical failures associated with implementation failure - There were 6 superordinate categories relating to implementation failure due to differences in: decision making; risk analysis; organisational culture; organisational alignment; readiness to change; and change management.	- Implementation failure - Organisational structure - Uncertainty	Social ambiguity Implementation failure
“Choice Deferral”					
Chen, M., Ma, X., & Pethtel, O. (2011). Age differences in trade-off decisions: older adults prefer choice deferral. <i>Psychology and Ageing</i> , 26 (2), 269-273.	Choice deferral and age	Quantitative – empirical study (consumer DM)	- Choice deferral in older adults was more likely and acted to reduce negative emotions - Choice deferral in younger adults only if will maximise outcomes	- Choice deferral - Age difference - Emotion - Maximising	Individual differences Experienced emotions Decision avoidance
Dhar, R. (1997). Context and task effects on choice deferral. <i>Marketing Letters</i> , 8(1), 119-130.	Literature review on consumer decision making	Qualitative – literature review (consumer DM)	- 2 key factors which increase choice deferral: option attractiveness (equally attractive); choice difficulty (small difference; highly valued) - Choice deferral further increased by task context relating to: decision strategies (weighing pros and cons; simultaneous presentation of options); time pressure (low time pressure) - Low time pressure also = ‘action deferral’ (implementation failure) as fail to execute action	- Choice deferral - Option attractiveness - Weighing pros and cons - Time Pressure - Implementation failure	Task ambiguity Decision avoidance Implementation Failure
Huber, J. (1995). Special Session Summary: The antecedents and consequences of choice deferral. <i>Advances in Consumer Research</i> , 22,	Literature review on consumer decision making	Qualitative – literature review on 4 studies (consumer DM)	- Contrasting findings due to difficulties in decision avoidance research as: difficult to differentiate between deferral and ‘no’ decision; choice deferral is influenced by external factors to options (e.g. income, risk attitude)	- Choice deferral - External distractions	Decision avoidance
Kopylov, I. (2009). Choice deferral and ambiguity aversion. <i>Theoretical Economics</i> , 4, 199-225.	Uncertainty and rational decision making	Quantitative – theoretical economics	- Uncertain choice = defer due to ambiguity aversion - Will only select uncertain choice if it is greater than alternative option	- Choice deferral - Uncertainty - Rational choice	Task ambiguity Experienced emotions Decision avoidance
Kozup, J.C., & Creyer, E.H. (2006). Boundary conditions of the impact of hypervigilant coping style on the subjective decision-making experience. <i>Psychology & Marketing</i> , 23(11), 905-925.	Time pressure and individual differences	Quantitative – empirical study (consumer DM)	- Time pressure degraded DM as more difficult and increased deferral - Coping styles (e.g. hypervigilant) had no effect on DM	- Choice deferral - Time Pressure - Coping style	Task ambiguity Decision avoidance
Mourali, M., Pons, F., Hassay, D. (2011). Power and deferral: the role of anticipated regret. <i>American Marketing Association, Summer 2011</i> , 147-148.	Choice deferral, power and anticipated regret	Quantitative – empirical study (consumer DM)	- Anticipated regret increases or decreases action depending if attached to omission or commission regrets - High sense of power = lower choice deferral and anticipated regret - If make regret salient then power no longer protects	- Choice deferral - Power - Anticipated regret - Omission/ Commission bias	Individual differences Anticipated emotions Decision avoidance
Novemsky, N., Dhar, R., Schwarz, N., & Simonson, I. (2007). Preference fluency in choice. <i>Journal of Marketing Research</i> ,	Preference fluency on consumer DM	Quantitative – empirical study (consumer DM)	- Preference fluency (subjective choice difficulty) influences DM - Subjectively more difficult choice = increased choice deferral and more likely to opt for compromise option	- Choice deferral - Preference fluency - Difficulty	Experienced emotions Decision avoidance

347-356.				- Compromise	
Parker, J.R., & Schrift, R.Y. (2011). Rejectable choice sets: how seemingly irrelevant no-choice options affect consumer decision processes. <i>Journal of Marketing Research</i> , 840-845.	Choice deferral and consumer DM	Quantitative – empirical study (consumer DM)	- The ‘no choice’ option increases: alternative-based processing (evaluate each option individually); focus on enriched (subjectively meaningful) attributes; focus on minimum threshold (is it good enough?)	- Choice deferral - Alternative-based processing - Enriched attributes - Maximising	Goal conflict Decision inertia
Patalano, A.L., & Wengrovitz, S.M. (2007). Indecisiveness and response to risk in deciding when to decide. <i>Journal of Behavioral Decision Making</i> , 20, 405-424.	Decisive personalities and risky DM	Quantitative – empirical study (hypothetical college choice)	- Decisive = adapt behaviour in response to risk [when risky to defer] (risky = make decision; no risk = defer) - Indecisive = always defer (even if risky) - Decisive individuals = seek dominant option (which is best?) - Indecisive individuals = use minimum threshold (any good enough?)	- Choice deferral - Trait decisiveness - Attribute-based processing - Alternative-based processing - Satisficing - Maximising	Individual differences Goal conflict Decision inertia
Roswarski, T.E., & Murray, M.D. (2006). Supervision of students may protect academic physicians from cognitive bias: A study of decision making and multiple treatment alternatives in medicine. <i>Medical Decision Making</i> , 26, 154-161.	Professional experience and choice deferral	Quantitative – empirical study (hypothetical medical decision making – practitioners)	- More treatment options = more likely to defer choice - Experience supervising students = no more likely to defer choice with more options - Due to experience (explicit and implicit knowledge as supervisors)	- Choice deferral - Option number - Experience - Implicit knowledge - Explicit knowledge	Task ambiguity Decision avoidance
van den Heuvel, C., Alison, L., & Crego, J. (2012). How uncertainty and accountability can derail strategic ‘save life’ decisions in counter-terrorism simulations: a descriptive model of choice deferral and omission bias. <i>Journal of Behavioral Decision Making</i> , 25, 165-187.	Decision avoidance and team uncertainty	Qualitative – live transcripts (hostage negotiation training)	- Teams avoided choice by: implementation failure; or deferring choice - Three processing reason for avoidance due to maladaptive: ambient processing (uncertainty); cognitive processing (accountability); organisational (blame culture, lack of policy)	- Choice deferral - Implementation failure - Uncertainty - Accountability - Organisational constraints	Task ambiguity Social ambiguity Decision avoidance Implementation failure
van den Ven, N., Gilovich, T., & Zeelenberg, M. (2010). Delay, doubt and decision: how delaying a choice reduces the appeal of (descriptively) normative options. <i>Psychological Science</i> , 21(4), 568-573.	Choice deferral and doubt	Quantitative – empirical study (hypothetical voting)	- Choice deferral = decrease preference for normative option in the future - Choice deferral leads to increased doubt over normative option and thus alters future preferences	- Choice deferral - Normative options - Doubt	Experienced emotions Decision avoidance
White, C.M., & Hoffrage, U. (2009). Testing the tyranny of too much choice against the allure of more choice. <i>Psychology & Marketing</i> , 26(3), 280-298.	Choice deferral and option numbers	Quantitative – empirical study (consumer DM)	- Choice deferral occurs due to: maximising strategy (want the best); not met minimum threshold (none are good enough) - If maximising and increase options = increased choice deferral (tyranny of too much choice) - If minimum threshold and increase options = decrease choice deferral by satisficing	- Choice deferral - Number of options - Satisficing - Maximising	Task ambiguity Goal conflict Decision avoidance
“Sunk Cost Effect” AND “Decision Making”					
Beeler, J.D., & Hunton, J.E. (1997). The influence of compensation method and	Sunk-cost effect and	Quantitative – empirical study	- Sunk cost increases if told being held to account as individuals: reduce information search; increase search for retrospective info; escalated commitment	- Sunk-cost - Escalate commitment	Social ambiguity Anticipated emotions

disclosure level on information search strategy and escalation of commitment. <i>Journal of Behavioural Decision Making</i> , 10, 77-91.	accountability	(hypothetical investment DM)	- Sunk-cost associated with: cognitive dissonance; self-justification; accountability	- Cognitive dissonance - Accountability	Decision avoidance
Bornstein, B.H., Emler, C.A., & Chapman, G.B. (1999). Rationality in medical treatment decisions: is there a sunk-cost effect? <i>Social Science & Medicine</i> , 49, 215-222.	Sunk-cost and medical DM	Quantitative – empirical study (hypothetical medical DM – physicians)	- Little sunk-cost effect for medical treatment choices (unless personally responsible for original choice) - Related to domain-specific expertise as did show sunk-cost in non-medical choices	- Sunk-cost - Expertise	Social ambiguity Experience Anticipated emotions Decision avoidance
Braverman, J.A., & Blumenthal-Barby, J.S. (2012). <i>Social Science & Medicine</i> , 75, 186-192.	Sunk-cost and medical DM	Quantitative – empirical study (hypothetical medical DM – physicians)	- Little sunk-cost effect for medical treatment choices - If personally responsible = more likely to discontinue (reverse sunk-cost) and overcompensate - Those who did show sunk-cost (continue with inferior option) showed unrealistic optimism to option	- Sunk-cost - Expertise	Social ambiguity Experience Anticipated emotions Decision avoidance
Coleman, M.D. (2010). Sunk cost and commitment to medical treatment. <i>Current Psychology</i> , 29, 121-134.	Sunk-cost and medical DM	Quantitative – empirical study (hypothetical medical DM – patient)	- Compared monetary, effort and time investments - Monetary: no sunk-cost if prior investment is much larger than expected return (i.e. cut losses if aware made a massive error and no chance of gaining anything back from it) - Effort: sunk-cost effect no matter how big past investment (due to cognitive dissonance) - Time: no effects	- Sunk-cost - Sunk-effort - Sunk-time - Cognitive dissonance	Experienced emotions Decision avoidance
Coleman, M.D. (2010). Sunk-cost, emotion and commitment to education. <i>Current Psychology</i> , 29, 346-356.	Sunk-cost and educational DM	Quantitative – empirical study (hypothetical educational DM)	- Anger = increased sunk-cost and escalation of commitment - Fear = no effect on sunk-cost effect - Possible explanation = anger increases optimism in inferior option	- Sunk-cost - Anger	Experienced emotions Decision avoidance
Karlsson, N., Juliusson, A., Grankvist, G., Garling, T. (2002). Impact of decision goal on escalation. <i>Acta Psychologica</i> , 111, 309-322.	Sunk-cost and approach-avoidance goals	Quantitative – empirical study (hypothetical business and personal DM)	- Approach goal (max gains) = increased sunk-cost in business decisions - Avoid goal (minimise loss) = increased sunk-cost in personal decisions - Inconclusive results	- Sunk-cost - Approach-avoidance motivation	Goal conflict Decision avoidance
Kwak, J., & Park, J. (2012). Effects of a regulatory match in sunk-cost effects: a mediating role of anticipated regret. <i>Marketing Letters</i> , 23, 209-222.	Sunk-cost and approach-avoidance goals	Quantitative – empirical study (financial DM)	- Sunk-cost effect reduced if approach-avoidance conflict between desired outcome (approach/gain) and regulatory focus (avoid/loss) - This appears to be due to anticipated regret associated with failing to take action	- Sunk-cost - Approach-avoidance motivation - Anticipated regret	Goal conflict Anticipated emotions Decision avoidance
Laing, G.K. (2010). Impact of cognitive biases on decision making by financial planners: sunk cost, framing and problem space. <i>International Journal of Economics and Finance</i> , 2(1), 11-22.	Sunk-cost and framing effects	Quantitative – empirical study (financial DM)	- Sunk-cost (increased investment) is predicted more by size of past investment (larger=greater sunk-cost) than it is by the framing of possible positive or negative outcomes - If responsible for past decisions = increased sunk-cost	- Sunk-cost - Anticipated outcome - Responsibility	Goal conflict Experienced emotions Decision avoidance
Navarro, A.D., & Fantino, E. (2009). The sunk-time effect: an exploration. <i>Journal of Behavioural Decision Making</i> , 22, 252-270.	Sunk-cost, sunk-time and responsibility	Quantitative – empirical study (puzzle solving)	- Sunk-time effect (temporal sunk-cost) increased when: increased previous time invested; individual (as opposed to group) task; increased previous effort invested; feelings of personal responsibility	- Sunk-time - Sunk-effort - Responsibility	Goal conflict Decision avoidance
Otto, R. (2010). Three attempts to	Behavioural	Quantitative –	- No evidence found for sunk-effort effects	- Sunk-effort	Experienced emotions

replicate the behavioural sunk-cost effect: a note on Cunha and Caldieraro (2009). <i>Cognitive Science</i> , 34, 1379-1383.	Investment Sunk Cost effect (BISC)	empirical study (consumer DM)	- Questions robustness of sunk-investment effects for ‘behavioural’ factors		Decision avoidance
Schott, J.P., Scherer, L.D., & Lambert, A.J. (2011). Casualties of war and sunk costs: Implications for attitude change and persuasion. <i>Journal of Experimental Social Psychology</i> , 47, 1134-1145.	Sunk-cost and war attitude	Quantitative – empirical study (attitudes to war)	- Sunk-cost effect in attitudes to war (i.e. increase in casualties – continue or withdraw) if primed towards ‘don’t waste’ - Control = withdraw	- Sunk-cost - Priming - Don’t waste heuristic	Goal conflict Decision avoidance
Smith, C.M., Tindale, S.R., & Steiner, L. (1998). Investment decisions by individuals and groups in ‘sunk cost’ situations: potential impact of shared representations. <i>Group Processes and Intergroup Relations</i> , 1 (2), 175-189.	Sunk-cost and social groups	Quantitative – empirical study (financial DM)	- Sunk-cost exists in BOTH individuals and group DM - Personal investment (own money) = increased sunk-cost - Not responsible for first decision = reduce sunk-cost	- Sunk cost bias - Personal investment - Responsibility	Experienced emotions Decision avoidance
Stanovich, K.E., & West, R.F. (2008). On the relative independent of thinking biases and cognitive ability. <i>Personality Processes and Individual Differences</i> , 94(4), 672-695.	Cognitive biases and cognitive ability	Quantitative – empirical study (problem solving)	- Cognitive ability (intelligence) did NOT protect against cognitive biases - Cognitive bias is reduced by: appropriate mindware (information on rules/procedures/strategies to complete task); deductive reasoning ability (can detect when to override heuristic processing) (i.e. expertise) - BUT – if task requires ‘cognitive decoupling’ (i.e. can generate new solutions whilst detecting need to override heuristic processing) then cognitive ability facilitates overcoming biases	- Cognitive bias - Cognitive ability - Mindware - Expertise	Individual differences Experience Goal conflict Decision avoidance
Yen, C., & Lin, C. (2012). The effects of mortality salience on escalation of commitment. <i>International Journal of Psychology</i> , 47(1), 51-57.	Sunk-cost, mortality salience and military decision making	Quantitative – empirical study (hypothetical military scenario – practitioners)	- Sunk-cost increase when mortality is salient - Based on ‘Terror Management Theory’: self-justification to create a cultural worldview (society has a meaning); reduces cognitive dissonance to give world order, meaning, permanence	- Sunk-cost - Mortality Salience - Cognitive dissonance - Terror Management Theory	Experienced emotions Decision avoidance
Zeelenberg, M., & van Dijk, E. (1997). A reverse sunk cost effect in risky decision making: sometimes we have too much invested to gamble. <i>Journal of Economic Psychology</i> , 18, 677-691.	Behavioural sunk-cost and risky DM	Quantitative – empirical study (gamble DM)	- Sunk-cost and behavioural sunk-cost effect reduced if approach oriented (i.e. gains) - Feedback increases risk averse behaviour	- Sunk-cost - Behavioural sunk cost - Approach-avoidance motivation - Feedback	Goal conflict Decision avoidance
“Omission bias” AND “decision making”					
Aberegg, S.K., Haponik, E.F., & Terry, P.B. (2005). Omission bias and decision making in pulmonary and critical care medicine. <i>Chest</i> , 128(3), 1497-1505.	Omission and status quo bias in medical DM	Quantitative – empirical study (medical DM – physician)	- Both omission bias and status quo bias in medical experts (i.e. select suboptimal option if involves no action) - Possibly due to ‘do no harm’ bias in medics	- Omission bias - Status quo bias - Expertise - Protected values	Experience Experienced emotions Decision avoidance
Anderson, C.J. (2005). Alternative perspectives on omission bias. In C.R. Sunstein “Moral Heuristics”, <i>Behavioural and Brain Sciences</i> , 28, 531-573.	Alternative view of omission bias	Qualitative – opinion piece on moral heuristic decision making	- Omission bias (in moral decision making) may not exist outside the lab because real-life has too many confounding variables - We don’t understand what omission bias is, what causes it, what debiases it and what its implications are	- Omission bias - Moral heuristics	Decision avoidance
Asch, D.A., Baron, J., Hershey, J.C.,	Omission bias	Quantitative –	- Non-vaccination behaviour related to omission bias (perceived more harm from	- Omission bias	Social ambiguity

Kunreuther, H., Meszaros, J., Ritov, I., & Spranca, M. (1994). <i>Medical decision making</i> , 14, 118-123.	and parental vaccination decisions	empirical study (parental vaccination DM)	<ul style="list-style-type: none"> - vaccinating than not vaccinating) - Can possibly reverse by framing question about ‘self’ rather than ‘child’ i.e. would you ‘risk’ vaccinating yourself? 	<ul style="list-style-type: none"> - Negative consequences 	Anticipated emotions Decision avoidance
Baron, J. (1992). The effect of normative beliefs on anticipated emotions. <i>Journal of Personality and Social Psychology</i> , 63(2), 320-330.	Omission bias, normative beliefs and anticipated emotions	Quantitative – empirical study (moral DM; financial DM)	<ul style="list-style-type: none"> - Omission bias is reduced (along with anticipated negative emotions) if present a ‘normative argument’ (rational argument) - BUT if personally hold a non-normative belief (i.e. actually believe it rather than irrationally anchored to it), then normative belief can change behaviour (i.e. reverse omission bias) but still experience anticipated negative emotions (e.g. ok I will do it but I still feel guilty) 	<ul style="list-style-type: none"> - Omission bias - Anticipated emotions - Normative beliefs 	Experienced emotions Anticipated emotions Decision avoidance
Baron, J., Bazerman, M.H., & Shonk, K. (2006). Enlarging the societal pie through wise legislation. A psychological perspective. <i>Perspectives on Psychological Science</i> , 1(2), 123-132.	Cognitive biases and political DM	Qualitative – theoretical piece on cognitive biases and political DM	<ul style="list-style-type: none"> - Political DM is biased by ‘fixed pie’ approach – idea that there are finite resources and so focus on wins/losses rather than wider new gains - Poor political DM caused by: fixed pie approach; omission and status quo bias; parochialism (sacrifice self-interest for group e.g. strike); nationalism; dysfunctional competition; focus on ST over LT - Politicians need to consider utility theory to overcome 	<ul style="list-style-type: none"> - Omission bias - Status quo bias - Parochialism - Temporal focus 	Goal conflict Decision avoidance
Bartels, D.M., & Medin, D.L. (2007). Are morally motivated decision makers insensitive to the consequences of their choices? <i>Psychological Science</i> , 18(1), 24-28.	Moral decision making and anticipated consequences	Quantitative – empirical study (moral DM)	<ul style="list-style-type: none"> - Focus on whether <i>should</i> act then holding protected values makes individuals less focussed on consequences of choice (low loss threshold) - Focus on consequences of choice then holding protected values makes individuals more focussed on consequences of choice (high loss threshold) - Protected values have different effects depending on type of cog trade-off 	<ul style="list-style-type: none"> - Moral DM - Protected values - Loss thresholds 	Experienced emotions Goal conflict Decision avoidance
Benniss, W.M., Medin, D.L., & Bartels, D.M. (2010). The costs and benefits of calculation and moral rules. <i>Perspectives on Psychological Science</i> , 5(2), 187-202.	Moral rules and DM	Qualitative – discussion on use of moral rules in DM	<ul style="list-style-type: none"> - Rational DM in real world is unrealistic - Using moral rules (rather than cost-benefit) is a more useful strategy for DM as: cost-benefit insensitive to some decision domains (e.g. social); moral decisions are high consequence, low probability so lack expertise so better to use moral rules over difficult cost-benefit; some acts may seem irrational but have long-term gains (e.g. self-sacrifice) 	<ul style="list-style-type: none"> - Moral rules - Cost-benefit analysis - Social learning 	Experienced emotions
Bond, L., & Nolan, T. (2011). Making sense of perceptions of risk of diseases and vaccinations: a qualitative study combining models of health beliefs, decision making and risk perception. <i>Public Health</i> , 11, 1-14.	Risk, uncertainty and parental vaccination DM	Mixed methods – survey (parental vaccination DM)	<ul style="list-style-type: none"> - Perceived risk associated with: dread; unfamiliarity; uncontrollability - Individuals coped with uncertainty through: optimistic control (it won’t affect me); omission bias (more harm from vaccinating) - Action increased if anticipated unfamiliar risk (negative consq of inaction) - Action decreased if anticipated uncontrollable risk (vaccine side effects) 	<ul style="list-style-type: none"> - Risk - Uncertainty - Omission bias - Lack of control 	Experienced emotions Decision avoidance
Brooks, M.E. (2011). Management indecision. <i>Management Decision</i> , 49(5), 683-693.	Failures to act in management DM	Qualitative – theoretical model	<ul style="list-style-type: none"> - Failures to act caused by: Decision context (option quality [justification]; option similarity; number of options); Trait indecisiveness; Systematic biases (status quo; omission bias) - These effects depend upon (and moderated by) subjectivity - Failures to act occur via: Fail to make a choice; Postpone choice - Recommendations to reduce inaction: evaluate options independently; incentivise decisiveness; make loss due to delay salient 	<ul style="list-style-type: none"> - Failures to act - Decision context - Personality - Omission bias - Subjectivity - Choice deferral - Decision inertia 	Task ambiguity Social ambiguity Decision inertia Decision avoidance
Broeders, R., van den Bos, K., Muller, P.A., & Ham, J. (2011). Should I save or should I not kill? How people solve moral dilemmas depends on which rule is most	Moral rules and DM	Quantitative – empirical study (moral DM)	<ul style="list-style-type: none"> - Omission bias reduced if make approach goals more salient - Utilitarian choice (save life) can be primed through situational cues (e.g. visuals; subliminal images) to increase rational action (e.g. push man off bridge to kill one and save many) 	<ul style="list-style-type: none"> - Moral heuristics - Omission bias - Utilitarian rules (save life) 	Task ambiguity Experienced emotions Goal conflict Decision avoidance

accessible. <i>Journal of Experimental Social Psychology</i> , 47, 923-934.					
Brown, K.F., Kroll, S.J., Hudson, M.J., Ramsay, M., Green, J., Vincent, C.A., Fraser, G., & Sevdalis, N. (2010). Omission bias and vaccine rejection by parents of healthy children: implications for the influenza A/H1N1 vaccination programme. <i>Vaccine</i> , 4181-4185.	Omission bias and parental vaccination DM	Quantitative – online survey	<ul style="list-style-type: none"> - Omission bias occurred when parents rated the vaccination side-effects to be more: severe; probable; and longer duration 	<ul style="list-style-type: none"> - Omission bias - Negative consequences 	Anticipated emotions Decision avoidance
Connolly, T., & Reb, J. (2003). Omission bias in vaccination decisions: Where's the omission? Where's the bias? <i>Organisational Behaviour and Human Decision Processes</i> , 91, 186-202.	Omission bias in parental vaccination DM	Quantitative – empirical study (parental vaccination DM)	<ul style="list-style-type: none"> - Decision not to vaccinate is NOT due to omission bias (i.e. general preference to avoid action) but due to rational weights on associated and anticipated regret - If provide balanced information on vaccination and disease risks then parents opted to vaccinate 	<ul style="list-style-type: none"> - Omission bias - Anticipated regret 	Anticipated emotions Rational decision
Crotty, S.K., & Thompson, L. (2009). When your heart isn't smart: how different types of regret change decisions and profits. <i>International Journal of Conflict Management</i> , 20(4), 315-339.	Omission bias and rational-emotional regret	Quantitative – empirical study (decision games)	<ul style="list-style-type: none"> - Regrets of the 'heart' (emotional) were associated with: lost opportunities, emotions; and life maxim (lessons learnt) - Thinking about regrets of 'heart' = compromised behaviour (bargaining; sharing) leading to less profit in decision games - Recommend economic DM should actively focus on regrets of head rather than heart as better economic outcomes 	<ul style="list-style-type: none"> - Experienced Regret - Rational-Emotional 	Experienced emotions Decision inertia
Dekay, M.L., Patino-Echeverri, D., & Fischbeck, P.S. (2009). Better safe than sorry: Precautionary reasoning and implied dominance in risky decisions. <i>Journal of Behavioural Decision Making</i> , 22, 338-361.	Precautionary reasoning in high risk decisions	Quantitative – empirical study (binary decision problems)	<ul style="list-style-type: none"> - Individuals favour precautionary reasoning when faced with high-stakes binary decision problems (e.g. close airport due to thunderstorm or not?) - Individuals were more favourable of taking unnecessary action (false positive action) than <i>not</i> taking unnecessary action (true negative) - Precautionary reasoning was greatest in risk-averse individuals who generated worst case scenario first during decision process 	<ul style="list-style-type: none"> - Omission bias - Precautionary reasoning 	Goal conflict Decision inertia
DiBonaventura, M., & Chapman, G.B. (2008). Do decision biases predict bad decisions? Omission bias, naturalness bias, and influenza vaccination. <i>Medical Decision Making</i> , 28, 532-539.	Omission bias in parental vaccination DM	Quantitative – survey data (real life parental vaccination DM)	<ul style="list-style-type: none"> - Omission bias was associated with real-world vaccination decisions - Also found a 'naturalness bias' (preference towards natural products) to be associated (suggest 'other' influences play a role in real world) 	<ul style="list-style-type: none"> - Omission bias 	Decision avoidance
Kordes-de Vaal, J.H. (1996). Intention and the omission bias: Omissions perceived as nondecisions. <i>Acta Psychologica</i> , 93, 161-172.	Omission bias and perceived causality	Quantitative – empirical study (decision problems)	<ul style="list-style-type: none"> - Omission bias occurs because (in comparison to causing harm by commission) individuals feel less responsible for potential negative outcomes - Associated with perception of low causality (I didn't take action that caused them) and low intention (I didn't intend for that to happen) 	<ul style="list-style-type: none"> - Omission bias - Responsibility 	Experienced emotions Decision avoidance
Polman, E. (2012). Self-other decision making and loss aversion. <i>Organisational Behaviour and Human Decision Processes</i> , 119, 141-150.	Loss aversion and deciding for others	Quantitative – empirical study (decision problems)	<ul style="list-style-type: none"> - When deciding for others individuals show less loss aversion - Loss aversion is reduced due to: construal level; approach-avoidance focus; preference for information seeking; preference for omission bias; feelings of power 	<ul style="list-style-type: none"> - Loss aversion - Social DM - Construal level - Approach-avoidance motivation - Omission bias - Power 	Social ambiguity Goal conflict Decision inertia

Powell, N.L., Derbyshire, S.W.G., & Guttentag, R. (2012). Biases in children's and adults' moral judgements. <i>Journal of Experimental Child Psychology</i> , 113, 186-193.	Moral decision making and age	Quantitative – empirical study (moral DM)	<ul style="list-style-type: none"> - For both adults and children, harm was more negatively when it was: due to action (omission bias); involved physical contact; it was intended - Whereas adults could use utilitarian reasoning (i.e. greater good), children <i>always</i> see harm as negative (and thus not due to omission bias) 	<ul style="list-style-type: none"> - Moral heuristics - Omission bias - Physical proximity - Intuitive reasoning 	Experienced emotions Goal conflict Decision avoidance
Ritov, I. (2006). The effect of time on pleasure with chosen outcomes. <i>Journal of Behavioural Decision Making</i> , 19, 177-190.	Choice satisfaction and temporality	Quantitative – empirical study (decision scenario)	<ul style="list-style-type: none"> - Satisfaction with choice tends to decrease over time as individuals engage in counterfactual thinking and experience regret for rejected options 	<ul style="list-style-type: none"> - Counterfactual thinking - Regret - Temporal focus 	Goal conflict Experienced emotions
Ritov, I., & Baron, J. (1995). Outcome Knowledge, regret and omission bias. <i>Organisational Behaviour and Human Decision Processes</i> , 64(2), 119-127.	Omission bias, regret and outcome certainty	Quantitative – empirical study (decision scenarios)	<ul style="list-style-type: none"> - Individuals are less risk taking when they anticipate potential for regret and so will try and avoid decisions if they know they will get certain outcome knowledge (i.e. feedback on how good/bad their choice was) - Anticipated regret reduces if uncertain outcome knowledge (won't find out if choice was good or bad) 	<ul style="list-style-type: none"> - Omission bias - Anticipated regret - Outcome knowledge 	Anticipated emotions
Rogers, T., & Bazerman, M. H. (2008). Future lock-in: Future implementation increases selection of 'should' choices. <i>Organisational Behaviour and Human Decision Processes</i> , 106, 1-20.	Moral DM and temporal focus	Quantitative – empirical study (decision scenarios)	<ul style="list-style-type: none"> - Individuals opt for more deliberative 'should' options (over more affective 'want' choices) when the decision is to be implemented in the distant future ('future lock in') - 'Should self' operates at a higher construal level (rational superordinate) than 'want self' which is more concrete with short-term outcome focus 	<ul style="list-style-type: none"> - Moral DM - Temporal focus - Rational-emotional processing 	Goal conflict Experienced emotions
Tanner, C. (2009). To act or not to act: nonconsequentialism in environmental decision-making. <i>Ethics and Behaviour</i> , 19(6), 479-495.	Omission bias and protected values (moral DM)	Quantitative – empirical study (moral DM)	<ul style="list-style-type: none"> - Protected values when making moral decisions (e.g. environmental change) were found to: increase action; reduce trade-off; deontological focus; position of moral universalism 	<ul style="list-style-type: none"> - Omission bias - Protected values 	Experienced emotions
Tanner, C., & Medin, D.L. (2004). Protected values: no omission bias and no framing effects. <i>Psychonomic Bulletin & Review</i> , 11(1), 185-191.	Omission bias and protected values (moral DM)	Quantitative – empirical study (moral DM)	<ul style="list-style-type: none"> - Protected values when making moral decisions (e.g. environmental change) led to <i>increased</i> action (moral obligation to act) - Protected values protected against cognitive biases (e.g. framing) 	<ul style="list-style-type: none"> - Omission bias - Protected values 	Experienced emotions
Wroe, A.L., Turner, N., & Salkovskis, P.M. (2004). Understanding and predicting parental decisions about early childhood immunisations. <i>Health Psychology</i> , 23(1), 33-41.	Omission bias and parental vaccination DM	Quantitative – survey of expectant mothers	<ul style="list-style-type: none"> - Most expectant mothers were in favour of action (<i>not</i> omission bias) - Associated with: perceive disease as more harmful; anticipated regret and responsibility for harm via omission 	<ul style="list-style-type: none"> - Omission bias - Anticipated regret - Responsibility 	Anticipated emotions Rational decision
Yen, H.R., & Chuang, S.C. (2008). The effect of incidental affect on preference for the status quo. <i>Journal of the Academic Marketing Science</i> , 36, 522-537.	Status quo bias and affect	Quantitative – empirical study (consumer DM)	<ul style="list-style-type: none"> - Positive affect increased desire to maintain status quo and increased omission bias - Positive emotions led to increased feelings of certainty (mediator role) in current status that motivated desire to maintain status quo and omission bias 	<ul style="list-style-type: none"> - Status quo - Emotion 	Experienced emotions Decision avoidance
Zeelenberg, M., van Dijk, W.W., Manstead, A.S.R., & van der Pligt, J. (2000). On bad decisions and disconfirmed expectancies: the psychology of regret and disappointment.	Regret and Disappointment	Qualitative – literature review on regret and disappointment in DM	<ul style="list-style-type: none"> - Need to combine behavioural DM and emotion theories to understand DM - Regret caused by responsibility and results in: blame oneself; overly focus on regretted option; reparative action to change/undo situation - Anticipated regret induces: increased info search; elaborate DM; reduces post-decisional feedback 	<ul style="list-style-type: none"> - Regret - Disappointment - Anticipated emotion 	Experienced emotions Anticipated emotions

<i>Cognition and Emotion</i> , 14(4), 521-541.			<ul style="list-style-type: none"> - Disappointment is caused by unexpected adverse outcomes and results in: powerlessness; inaction as feel out of control - Anticipated disappointment induces: reduced expectations on outcome 		
Zeelenberg, M., van der Pligt, J., & de Vries, N.K. (2000). Attributions of responsibility and affective reactions to decision outcomes. <i>Acta Psychologica</i> , 104, 303-315.	Responsibility and affect in DM	Quantitative – empirical study (decision problems)	<ul style="list-style-type: none"> - Immediate affective reactions are experienced more strongly following action (over inaction) due to perceived responsibility (actor effect) - Differs to post-decisional affect that may change over time (e.g. affect from action decreases whereas affect from inaction increases) 	<ul style="list-style-type: none"> - Action effect - Responsibility - Temporality 	Experienced emotions
Zikmund-Fisher, B.J., Sarr, B., Fagerlin, A., & Ubel, P.A. (2006). A matter of perspective: choosing for others differs from choosing for yourself in making treatment decisions. <i>Journal of General International Medicine</i> , 21, 618-622.	Omission bias and social DM	Quantitative - empirical study (medical DM – for social others)	<ul style="list-style-type: none"> - Omission bias in medical DM was reduced if individuals were told to consider themselves in the role of the physician (more rational) - Omission bias was associated with increased emotions 	<ul style="list-style-type: none"> - Omission bias - Emotion - Social role 	Social ambiguity Experienced emotions
“inaction inertia”					
Arkes, H.R., Kung, Y., & Hutzel, L. (2002). Regret, valuation, and inaction inertia. <i>Organisational behaviour and human decision processes</i> , 87(2), 371-385.	Inaction inertia and regret	Quantitative – empirical study (consumer DM)	<ul style="list-style-type: none"> - Experienced regret (associated with past loss) induces inaction inertia rather than anticipated regret associated with future counterfactuals - Inaction inertia occurs as individuals devalue second option 	<ul style="list-style-type: none"> - Inaction inertia - Regret - Devaluation 	Experienced emotions Decision avoidance
Dholakia, U.M., Gopinath, M., & Bagozzi, R.P. (2005). The role of desires in sequential impulsive choices. <i>Organisational Behaviour and Human Decision Processes</i> , 98, 179-194.	Sequential impulsive choices	Quantitative – empirical study (decision problems)	<ul style="list-style-type: none"> - Evidence of a Sequential Mitigation Effect – people are less impulsive in DM if they have already been impulsive in previous choice - An individual’s chronic sensitivity to outcomes moderates this effect (positive outcome sensitivity = maintain impulsivity; negative outcome sensitivity = reduce impulsivity a lot) 	<ul style="list-style-type: none"> - Impulsivity 	Individual differences Experienced emotions Decision avoidance
Patrick, V.N., Lancellotti, M., & Demello, G. (2009). Coping with non-purchase: managing the stress of inaction regret. <i>Journal of Consumer Psychology</i>	Inaction inertia and regret	Quantitative – empirical study (consumer DM)	<ul style="list-style-type: none"> - Inaction inertia and the desire to reduce cognitive dissonance are coping mechanisms used to deal with regret - If missed opportunity is perceived as goal relevant and irreversible then this <i>increases</i> behavioural intent towards action as individuals cope by seeking out future opportunities to act 	<ul style="list-style-type: none"> - Inaction inertia - Regret - Coping mechanism - Reversibility 	Task ambiguity Experienced emotions Decision avoidance
Patrick, V.N., Lancellotti, M., & Hagtvedt, H. (2009). Getting a second chance: the role of imagery in the influence of inaction regret on behavioural intent. <i>Journal of the academy of marketing science</i> , 37, 181-190.	Inaction inertia and preference fluency	Quantitative – empirical study (consumer DM)	<ul style="list-style-type: none"> - When second opportunity is no worse than missed opportunity then motivated to take it (no inaction inertia) - More likely to take it than those who had not missed previous opportunity due to mental imagery associated with regret (regret=imagery=action) - If prevented mental imagery (e.g. increase cognitive load) then behavioural intent reduced 	<ul style="list-style-type: none"> - Inaction inertia - Regret - Mental Imagery 	Experienced emotions Anticipated emotions Decision avoidance
Sevdalis, N., Harvey, N., & Yip, M. (2006). Regret triggers inaction inertia – but which regret and how? <i>British Journal of Social Psychology</i> , 45, 839-853.	Inaction inertia, regret and devaluation	Quantitative – empirical study (consumer DM)	<ul style="list-style-type: none"> - Inaction inertia is specifically explained by regret (devaluation is more general to decision making) - Anticipated regret led to inaction inertia when there is a large difference in attractiveness between first and second - Experienced regret led to inaction inertia when there is a small difference in 	<ul style="list-style-type: none"> - Inaction inertia - Anticipated regret - Experienced regret - Valuation 	Experienced emotions Anticipated emotions Decision avoidance

			attractiveness between first and second		
Shani, Y., Tykocinski, O.E., Zeelenberg, M. (2008). When ignorance is not bliss: how feelings of discomfort promote the search for negative information. <i>Journal of Economic Psychology</i> , 29, 643-653.	Negative affect, outcome certainty and information search	Quantitative – empirical study (gambling DM)	<ul style="list-style-type: none"> - Individuals engage in post-event information search to reduce regret and negative emotions - Individuals seek definite knowledge to reduce negative emotion associated with ignorance – also to uncover possible aversive info - Uncovering bad news from search is more positive than uncertainty as would rather have definite bad news than uncertain knowledge 	<ul style="list-style-type: none"> - Post-event information search - Emotion - Ambiguity aversion 	Experienced emotions
Tykocinski, O., & Israel, R. (2006). Inaction inertia in the stock market. <i>Journal of Applied Social Psychology</i> , 34(6), 1166-1175.	Inaction inertia and financial DM	Quantitative – empirical study (financial DM)	<ul style="list-style-type: none"> - If missed opportunity has large difference = increased inaction inertia and spent less time searching for information - Suggests reduced information search as trying to reduce experienced regret 	<ul style="list-style-type: none"> - Inaction inertia - Information search 	Experienced emotions Decision avoidance
Tykocinski, O.E., & Ortmann, A. (2011). The lingering effects of our past experiences: the sunk-cost fallacy and the inaction-inertia effect. <i>Social and Personality Psychology Compass</i> , 59, 653-664.	Sunk-cost and Inaction Inertia	Qualitative – lit review on sunk-costs and inaction inertia	<ul style="list-style-type: none"> - The assumption that using past decisions to inform future choice is irrational is flawed (e.g. sunk-cost increase action; inaction inertia decrease action) - BUT using past choice may actually be very rational in the real-world (e.g. avoid blame from past investments in organisations can help facilitate social identities in groups) - Is it possible to ignore the past in real world? If not then why waste research studying it as ‘irrational’ behaviour? 	<ul style="list-style-type: none"> - Inaction inertia - Sunk costs - Real-world DM 	General exogenous factors Rational decision
Tykocinski, O.E., & Pittman, T.S. (1998). The consequences of doing nothing: inaction inertia as avoidance of anticipated counterfactual regret. <i>Journal of Personality and Social Psychology</i> , 75 (3), 607-616.	Inaction inertia and regret	Quantitative – empirical study (consumer DM)	<ul style="list-style-type: none"> - Inaction inertia increased with greater difference between first and second opportunities - Inaction inertia was reduced however if regret was unavoidable; costs of avoidance were increased; or regret made redundant - Inaction inertia is explained by regret 	<ul style="list-style-type: none"> - Inaction inertia - Anticipated regret - Experienced regret - Counterfactual thinking 	Experienced emotions Anticipated emotions Decision avoidance
Tyocinski, O.E., Pitmann, T.S., & Tuttle, E.E. (1995). Inaction inertia: foregoing future benefits as a result of an initial failure to act. <i>Journal of Personality and Social Psychology</i> , 68(5), 793-803.	Inaction inertia	Quantitative – empirical study (decision problems)	<ul style="list-style-type: none"> - First major study on inaction inertia (how missing a slightly more attractive opportunity reduces likelihood of acting at second opportunity) - Inaction inertia due to large (v small/medium) differences in attractiveness - Motivated by loss aversion associated with anticipated regret as inaction inertia removed if new opportunity framed as a gain 	<ul style="list-style-type: none"> - Inaction inertia - Loss aversion - Regret 	Anticipated emotions Decision avoidance
Van Dijk, E., & Zeelenberg, M. (2005). On the psychology of ‘if only’: regret and the comparison between factual and counterfactual outcomes. <i>Organisational behaviour and human decision processes</i> , 97, 152-160.	Inaction inertia and counterfactual thinking	Quantitative – empirical study (gambling DM)	<ul style="list-style-type: none"> - When individuals can’t compare missed and current options then this reduces overall experiences of regret - Can reduce comparisons by creating uncertainty about missed opportunity; or if they were incomparable (e.g. sofa v chair) - Those high on ‘need to compare’ experienced high regret even when options were incomparable 	<ul style="list-style-type: none"> - Regret - Counterfactual - Compatibility 	Individual differences Experienced emotions
Van Harreveld, F., van der Pligt, J., & Nordgren, L. (2008). The relativity of bad decisions: social comparison as a means to alleviate regret. <i>British Journal of Social Psychology</i> , 47, 105-117.	Regret and social comparison	Quantitative – empirical study (gambling DM)	<ul style="list-style-type: none"> - Regret decreases if find out social others did worse - Irreversible Task = Increase social comparison information to try and reduce regret (psychological coping) - Second chance at task = increase task-related information search to reduce anticipated regret at second chance (behavioural coping) - Need to avoid focussing on irreversibility to avoid biases 	<ul style="list-style-type: none"> - Regret - Social comparison - Reversibility 	Task ambiguity Social ambiguity Experienced emotions
Van Putten, M., Zeelenberg, M., & van Dijk, E. (2007). Decoupling the past from	Inaction inertia and decoupling	Quantitative – empirical study	<ul style="list-style-type: none"> - Decoupling past and present opportunities reduces inaction inertia as individuals use different mental accounts and so don’t compare 	<ul style="list-style-type: none"> - Inaction inertia - Decoupling 	Task ambiguity Goal conflict

the present attenuates inaction inertia. <i>Journal of Behavioural Decision Making</i> , 20, 65-79.		(consumer DM)	<ul style="list-style-type: none"> - Inaction inertia decreased (through decoupling) when: missed opportunity was ambiguous; psychological distance between past and present opportunities; incomparability between past and current - Possibly due to role of reduced regret (but not tested) 	<ul style="list-style-type: none"> - Regret 	Experienced emotions Decision avoidance
Van Putten, M., Zeelenberg, M., & van Dijk, E. (2008). Multiple options in the past and the present: the impact on inaction inertia. <i>Journal of Behavioural Decision Making</i> , 21, 519-531.	Inaction inertia and multiple options	Quantitative – empirical study (consumer DM)	<ul style="list-style-type: none"> - Multiple missed opportunities = increased inaction inertia - Multiple new options = reduced inaction inertia (as no longer use missed opportunity as reference point) - Inaction inertia may be redundant in real-life as most choices are characterised by having multiple options available 	<ul style="list-style-type: none"> - Inaction inertia - Multiple options 	Task ambiguity Decision avoidance Rational choice
Van Putten, M., Zeelenberg, M., & van Dijk, E. (2009). Dealing with missed opportunities: Action vs state orientation moderates inaction inertia. <i>Journal of Experimental Social Psychology</i> , 45, 808-815.	Inaction inertia and personality	Quantitative – empirical study (consumer DM)	<ul style="list-style-type: none"> - Both state- and action-oriented individuals experience regret following missed opportunity by only state-oriented let I influence their DM - Increased inaction inertia in state-orientated individuals (fixate on negative emotions; ruminate on past) but temporal segregation of first and second opportunities reduces this effect 	<ul style="list-style-type: none"> - Inaction inertia - Personality - Regret 	Individual differences Experienced emotions Goal conflict Decision avoidance
Wong, K.F.E., Yik, M., & Kwong, J.Y.Y. (2006). Understanding the emotional aspects of escalation of commitment: the role of negative affect. <i>Journal of Applied Psychology</i> , 91(2), 282-297.	Escalation of commitment and negative affect	Quantitative – empirical study (organisational DM)	<ul style="list-style-type: none"> - Individuals try and cope with negative affect (trait or transient) by <i>reducing</i> commitment when one was personally responsible for previous bad decision (i.e. reverse of sunk-cost effect as reduced commitment) - If not responsible for previous decision then negative affect had no influence on DM 	<ul style="list-style-type: none"> - Sunk-cost - Emotion - Coping mechanism 	Experienced emotions Rational decision
Zeelenberg, M., Nijstad, B.A., van Putten, M., van Dijk, E. (2006). Inaction inertia, regret and valuation: a closer look. <i>Organisational Behaviour and Human Decision Processes</i> , 101, 89-104.	Inaction inertia, regret and devaluation	Quantitative - empirical study (consumer DM)	<ul style="list-style-type: none"> - Inaction inertia was NOT caused by regret – influential factors on regret did not influence inaction inertia and vice versa - Instead it appeared individuals devalued second option after missing first - Regret is NOT a causal factor of inaction inertia but devaluation is a mediating causal factor in inaction inertia – regret may be a by-product of devaluation (i.e. devalue option and so would regret taking it) 	<ul style="list-style-type: none"> - Inaction inertia - Devaluation - Regret 	Experienced emotions
“Grey literature” – Book chapters, reference chaining, unpublished work					
Alison, L., Doran, B., Long, M.L., Power, N., & Humphrey, A. (2013). The effects of subjective time pressure and individual differences on hypotheses generation and action prioritization in police investigations. <i>Journal of Experimental Psychology: Applied</i> , 19(1), 83-93.	Time pressure and hypothesis generation	Quantitative – empirical study (police DM)	<ul style="list-style-type: none"> - Time pressure reduced hypotheses generation as people felt subjectively pressured by time - Those who did not subjectively perceive time pressure did not alter their hypotheses generation - Time pressure also increased action prioritization 	<ul style="list-style-type: none"> - Time pressure - Hypotheses generation 	Individual differences
Alison, L., Power, N., van den Heuvel, C., & Waring, S. (2015). A taxonomy of endogenous and exogenous uncertainty in high-risk, high-impact contexts. <i>Journal of Applied Psychology</i> . Online first. http://dx.doi.org/10.1037/a0038591	Taxonomy of uncertainty in high-risk contexts	Mixed methods – quantitative and qualitative analyses of hostage negotiation training	<ul style="list-style-type: none"> - Uncertainty in high-stakes contexts can be categorised as endogenous (derived from problem environment) or exogenous (derived from operating system responding to incident) - Most uncertainty derived from exogenous sources (75%) and was associated with poor role understanding and trust within team 	<ul style="list-style-type: none"> - Endogenous uncertainty - Exogenous uncertainty - Trust - Role understanding 	Task ambiguity Social ambiguity
Alison, L., Power, N., van den Heuvel, C., Humann, M., Palasinski, M., & Crego, J.	Decision inertia in emergency	Mixed methods – quantitative and	<ul style="list-style-type: none"> - Communication between agencies decreased and focus on within-agency information seeking increased when decision problems characterised by 3 barriers: non-time 	<ul style="list-style-type: none"> - Decision inertia - Time pressure 	Task ambiguity Social ambiguity

(2015). Decision inertia: deciding between least worst outcomes in emergency responses to disasters. <i>Journal of Occupational and Organisational Psychology</i> .	response	qualitative analyses of multi-agency, emergency response hydra simulation	bounded; multiple agencies (3+); lack of superordinate direction	- Multi-agency - Strategic goals	
Campbell, D., Jones, S., & Brindle, D. (2008). 50 injuries, 60 visits – failures that led to the death of Baby P. <i>The Guardian</i> . Available via http://www.theguardian.com/society/2008/nov/12/baby-p-child-protection-haringey [Accessed 3rd January 2015]	Review on failures in Baby P social care investigation	Qualitative – news story on social care failures in Baby P Case	- Social care workers and child protection authorities blamed for missing signs of Baby P's abuse following tens of visits to the toddler's home	- N/A	Decision inertia
Corr, P.J. (2013). Approach and Avoidance Behaviour: Multiple systems and their interaction. <i>Emotion Review</i> , 5(3), 285-290.	Outlines three types of approach-avoidance motivation	Qualitative – literature review summary	- Two major avoidance systems: active avoidance related to pure avoidance away from aversive stimuli; passive avoidance due to behavioural inhibition caused by goal conflict - Activation of either system dependent on proximal-distal factors of threat (i.e. nearby = active avoidance; far away = passive avoidance)	- Approach-avoidance motivation - Proximal-distal factors	Goal conflict
Corr, P.J., & McNaughton, N. (2012). Neuroscience and approach/avoidance personality traits: A two stage (valuation-motivation) approach. <i>Neuroscience and Biobehavioural Reviews</i> , 36, 2339-2354.	Approach-avoidance motivation and loss aversion	Qualitative – theoretical review on interaction between motivation, valuation and loss aversion	- Valuation of options (e.g. loss aversion) is distinct from motivation - Valuations act to reinforce behaviour associated with approach-avoidance motivation towards/away from a positive/negative stimulus - Distinct systems manage active avoidance (FFS) compared to passive avoidance that represents goal conflict and the BIS due to approach-avoidance conflicting goals	- Approach-avoidance motivation - Passive/active avoidance - Loss aversion	Goal conflict Decision avoidance Decision inertia
Corr, P.J., DeYoung, C.G., & McNaughton, N. (2013). Motivation and personality: A Neuropsychological perspective. <i>Social and Personality Psychology Compass</i> , 7/3, 158-175.	Different avoidance motivations and personality	Qualitative – Discussion on neuropsychological research on approach-avoidance motivation and personality	- 2 approach systems: one associated to actions for award seeking and other to behaviour related to reward receiving- BAS - 2 avoidance systems: passive avoidance (behavioural inhibition due to goal conflict - BIS); active avoidance (panic and desire to escape - FFS) - Motivations product of stimuli or based on personality	- Approach-avoidance motivation - Passive/active avoidance - Personality	Individual differences Goal conflict Decision avoidance Decision inertia
Elliot, A.J. (2006). The hierarchical model of approach-avoidance motivation. <i>Motivations and Emotion</i> , 30, 111-116.	Approach-avoidance motivation	Qualitative – theoretical model of approach-avoidance motivation	- Approach motivation is the energization of behaviour towards a positive stimulus Avoidance motivation is the energization of behaviour away from a negative stimulus	- Approach-avoidance motivation	Goal conflict
Elliot, A.D., Eder, A.B., & Harmon-Jones, E. (2013). Approach-avoidance motivation and emotion: convergence and divergence. <i>Emotion Review</i> , 5(3), 308-311.	Approach-avoidance motivation and emotion	Qualitative – summary on special journal issue on approach-avoidance motivation	- Approach-avoidance research is central to understanding emotion - Need cross-talk between different disciplines to understand emotion and approach-avoidance motivation	- Approach-avoidance motivation - Emotion	Goal conflict
Eyre, M., Alison, L., Crego, J., & Mclean C. (2008). Decision inertia: the impact of organisations on critical incident decision-	Decision inertia and critical incident DM	Qualitative – literature review and simulated exercise	- Decision inertia associated with: responsibility; accountability; distrust in team; blame culture; high value attributes; organisational policies; preference stability; costs of action and change	- Decision inertia - Accountability - Trust	Task ambiguity Social ambiguity Experienced emotions

making. In L.J. Alison & J. Crego, <i>Policing Critical Incidents: Leadership and Critical Incident Management</i> . Devon, UK: Willan Publishing.		data	<ul style="list-style-type: none"> - Experienced emotions include: fear, regret - Anticipated emotions include: anticipated organisational reaction; anticipated regret; anticipated blame; selection difficulty - Decision avoidance occurs via status quo; omission; deferral 	<ul style="list-style-type: none"> - Organisational - Emotions - Omission bias - Choice deferral 	Anticipated emotions Decision avoidance Decision inertia
Gray, J.A. (1990). Brain systems that mediate both emotion and cognition. <i>Cognition and Emotion</i> , 4(3), 269-288.	Neurological basis of approach-avoidance motivation	Qualitative – neurobiological theory of approach-avoidance motivation	<ul style="list-style-type: none"> - 3 brain systems interact with motivation that act to link emotion and cognition - Behavioural approach system (BAS) = approach motivation - Fight/Flight system (FFS) and Behavioural Inhibition System (BIS) = avoidance motivation 	<ul style="list-style-type: none"> - Approach-avoidance motivation - Neurobiology - Emotion 	Goal conflict Experienced emotions
Grünewald, F., Binder, A., & Georges, Y. (2010). Inter-agency real time evaluation in Haiti: Three months after the earthquake. <i>URD and GPPI</i> .	Emergency aid following Haiti Earthquake	Qualitative – report on emergency response	<ul style="list-style-type: none"> - Weak humanitarian leadership and lack of ownership delayed humanitarian response to disaster - Emergency hospitals and personnel had limited resources which delayed response 	- N/A	Decision inertia
Harmon-Jones, E., Harmon-Jones, C., & Price, T.F. (2013). What is approach motivation? <i>Emotion Review</i> , 5(3), 291-295.	Approach motivation	Qualitative – literature review	<ul style="list-style-type: none"> - Approach motivation literature generally associates approach with positive affective states - But this paper suggests it can also be evoked by negative stimuli; that approach may be experienced as a negative state; and that stimuli are unnecessary to evoke motivation as motivation may be a trait 	<ul style="list-style-type: none"> - Approach motivation - Negative stimuli - Personality 	Individual differences Experienced emotions Goal conflict
Kahneman, D. (2003). Maps of bounded rationality: psychology for behavioural economics. <i>The American Economic Review</i> , 93(5), 1449-1475.	Review of Nobel prize winning work of Kahneman	Qualitative – overview of Kahneman's work	<ul style="list-style-type: none"> - Explains bounded rationality as explained and its influence on decision making and behavioural economics i.e. human behaviour is bounded by environmental constraints in the environment 	- Biased decision making	Task ambiguity
Kahneman, D., & Klein, G. Conditions for intuitive expertise: a failure to disagree. <i>American Psychologist</i> , 64 (6), 515-526.	Review on intuitive expertise	Qualitative – discussion paper	<ul style="list-style-type: none"> - Heuristics and biases and NDM research often seen as conflicting approaches - Both agree that intuition is based on predictability of decision making environment and subjective experience is unreliable indicator of decision accuracy 	<ul style="list-style-type: none"> - NDM - Heuristics - Intuitive expertise 	Experience
Klein, G. (2008). Naturalistic Decision Making. <i>Human Factors</i> , 50(3), 456-460.	Review of NDM	Qualitative – review of NDM	<ul style="list-style-type: none"> - NDM is study of decisions in real world settings that emphasises role of experience and effective decision making - Recognition primed decision making is an example that describes how experts use recognisable patterns learnt through domain specific experience in decision domain to make effective choices 	<ul style="list-style-type: none"> - NDM - Recognition primed DM 	Experience
Klein, G. A., Calderwood, R., & Clinton-Cirocco, A. (1986). Rapid decision making on the fireground. In <i>Proceedings of the Human Factors and Ergonomics Society 30th Annual Meeting</i> (Vol. 1, pp. 576-580). Norwood, NJ: Ablex.	RPD and fire fighter DM	Qualitative – interviews with fire service	<ul style="list-style-type: none"> - Experienced fire commanders only generated one option when responding to emergency - Could draw from a repertoire of stored options but expertise meant they selected first option that came to them which they rapidly evaluate through mental simulation to see if it would work 	<ul style="list-style-type: none"> - Recognition primed DM - Mental simulation 	Experience
Klein, G., Snowdon, D., & Pin, C.L. (2007). <i>Anticipator Thinking</i> . Asilomar Conference Grounds, Pacific Grove, CA.:	Anticipatory thinking	Qualitative – discussion on anticipatory thinking	<ul style="list-style-type: none"> - Anticipatory thinking is a critical macro cognitive function of individuals and teams to help people prepare for future - There are 3 types of anticipator thinking: pattern matching; trajectory tracking and 	- Anticipatory thinking	Anticipated emotions

NDM8 - the Eighth International Conference on Naturalistic Decision Making.			conditional thinking on implications		
McKee, S. (2011). <i>Age of Opportunity. Transforming the lives of older people in poverty</i> . UK: The Centre for Social Justice.	Review of government action on later life policies	Qualitative – report on political DM	- Argues that government fails to take action on important ethical issues when they are not seen as important to the political agenda	- N/A	Decision inertia
National Audit Office / Foreign & Commonwealth Office. (2005). <i>Joint findings on lessons to be learned from the handling of the response to the Indian Ocean tsunami</i> . Retrieved from http://www.nao.org.uk/report/consular-services-to-british-nationals/	Emergency aid following Boxing Day Tsunami in 2004	Qualitative – report on emergency response	- There were delays in medical response following Tsunami - Delays in informing relatives of those reported missing about fate of loved ones causing great distress to many families	- N/A	Decision inertia
Patrick, J. (2011). Evaluation Insights Haiti Earthquake Response Emerging Evaluation Lessons. <i>Evaluation Insights</i> , 1, 1-13.	Emergency aid following Haiti Earthquake	Qualitative – report on emergency response	- Novel information communication was used in response (e.g. social media) but there were serious delays in collating and sharing this information between agencies – due to poor information prioritisation	- N/A	Decision inertia
PEDU. (2012). <i>Review of Response to Flooding on 27th and 28th June 2012</i> . Retrieved from http://www.drdni.gov.uk/pedu-review-flood-response-june-2012.pdf	Emergency response to UK flooding	Qualitative – report on emergency response	- Flooding in June 2012 had a delayed response due to uncertainty about roles and responsibilities and who should take primacy	- N/A	Decision inertia
Roskes, M., Elliot, A.J., Nijstad, B.A., & De Dreu, C.K.W. (2013). Time pressure undermines performance under avoidance than approach motivation. <i>Personality and Social Psychology Bulletin</i> , 39(6), 803-813.	Time pressure on motivation	Quantitative – empirical study (decision games)	- Both trait and state avoidance motivation was degraded by time pressure - Time pressure had a more adverse effect on performance when avoidance motivation rather than approach motivated - Did not appear to be due to activation of FFS suggesting effects not due to increased stress - Avoidance motivations should be avoided in time pressured events	- Time pressure - Avoidance motivation	Task ambiguity Goal conflict Experienced emotions Decision avoidance
Sligte, D.J., de Dreu, C.K.W., & Nijstad, B.A. (2011). Power, stability of power, and creativity. <i>Journal of Experimental Social Psychology</i> , 47, 891-897.	Avoidant thinking and creativity	Quantitative – empirical study (decision game)	- Positions of power can influence cognitive processing and motivation - Avoidance motivations are associated with poor creativity and inflexible thinking - When power hierarchies are unstable in social groups, having a low power status can protect against negative effects	- Power - Avoidance motivation - Creative thinking	Social ambiguity Experienced emotions Decision avoidance
Tversky, A., & Kahneman, D. (1974). Judgement under uncertainty: Heuristics and Biases. <i>Science</i> , 185(4157), 1124-1131.	Heuristics and biases	Qualitative – discussion on heuristics and biases	- Discussion paper on different types of cognitive biases and heuristic rules including: representativeness; availability; and adjustment and anchoring.	- Heuristics and biases	Task ambiguity

Appendix Three: Critical Decision Method Information Sheet

INFORMATION SHEET

Using the Critical Decision Method to explore the experience of joint command level decision making during critical and major incidents

What is the research about?

We are interested in the experience of command level decision makers who have had to make important joint decisions during critical and major incidents.

What do I have to do?

A researcher and an assistant will conduct an interview with you (1.5-2 hours max) about your decision making. You will be asked to recall a time when you were faced with a challenging joint decision at a command level position. It can be from a real-life incident or during a training exercise. It should be a decision which, now on reflection, you believe could have been made sooner.

What are you measuring?

Interviews will be recorded via Dictaphone and then anonymously transcribed. We will use them to pick out key themes that help us to understand your experience of joint command level decision making.

Am I being tested?

No – you are NOT being tested. All information you provide will be made completely anonymous. All electronic data will be stored on a secure, password protected computer.

Will my data be passed on to my superiors?

No – all data is anonymous. The researchers will NOT pass on any personal information to your organisation or any external party. The data gathered is for research purposes only.

It is important to highlight however that if you disclose to the researcher something which could be considered as dangerous behaviour at work, either by yourself or another, then the researcher will be obliged to pass this information on to the research supervisor who may forward this information on to a relevant body.

Do I have to take part?

No – your participation in this research is completely voluntary. You are also free to withdraw from the research at any time should you decide that you no longer wish to take part.

Will I benefit from taking part?

Yes - Research will help us to understand how the emergency services make challenging joint decisions at command level. It will be used to help commanders make more robust and confident decisions in complex environments. The experience of the interview is often found to be enjoyable as it allows you the time and space to really think about and reflect on your own decision making in a trusted and informal environment.

I still have more questions before I agree to take part...

If you have any further queries about taking part in this research or questions about the aims of the research in general, please do not hesitate to contact the researchers. You can contact Professor Laurence Alison or Miss Nicola Power. If you would like to make a complaint about the research at any point, then please contact Laurence Alison in the first instance, followed by the ethics committee at ethics@liv.ac.uk.

Email: l.j.alison@liverpool.ac.uk

Phone: 07966963597

Email: nicola.power@liverpool.ac.uk

Phone: 07791344327

Thank you for taking the time to read this information sheet. If you would like to take part in this research then please contact Nicola Power at the email address above to arrange an interview

Appendix Four: Consent Form

Title of Research Project: Decision Inertia Interviews; Simulation

Researcher(s): Laurence Alison; Nicola Power

**Please
initial box**

1. I confirm that I have read and have understood the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my rights being affected.
3. I understand that, under the Data Protection Act, I can at any time ask for access to the information I provide and I can also request the destruction of that information if I wish.
4. I agree to take part in the above study.

☐☐☐☐

_____	_____	_____
Participant Name	Date	Signature
_____	_____	_____
Researcher	Date	Signature

The contact details of the project supervisor are:

[Professor Laurence Alison; Department of Psychological Sciences; Eleanor Rathbone Building, Bedford Street South, University of Liverpool; l.j.alison@liverpool.ac.uk; 07966963597]

The contact details of the student researcher are:

[Nicola Power; Department of Psychological Sciences; Eleanor Rathbone Building, Bedford Street South, University of Liverpool; Nicola.power@liverpool.ac.uk; 07791344327]

Appendix Five: Script for audio injects used in MTFA simulation

INJECT 1: Phone calls to 999. Reports of 3 men acting suspiciously on the station platform. Security approached to ask them what they were doing. Men have opened fire with automatic weapons on civilians at random on the platform.

MACC (audio): *Calls received 3 men have opened fire on civilians at Lime Street Station... Caller said weapons looked to be automatic... mass casualties... women, men and children killed and injured... men still active in area... police and ambulance en route...information that shooters are located near platforms 7,8 and 9...RVP for this incident declared as Smithdown Lane.*

INJECT 2: Participants are now at the RVP. Informed that the Police are actively engaged with shooters. They have been provided with mapping information of hot/warm/cold and RVP from the police. They must decide where to place FCP (forward command point).

No Audio

INJECT 3: A civilian who escaped from inside the station runs up to the participants. He is frantic and informs that there are a large number of casualties bleeding out in the hot zone. Shooters are still in the area and fire arms team are in the hot zone.

Civilian: *Hey hey you help me, quick help! You've got to get in there and help those people – they're dying in there!! There's kids in there and everything – those blokes just don't give a shit they're shooting everyone. I know there's... there's some people near where I was... and they're hiding... they're by starbucks no nero er ahhh what's it called?!... the woman anyway you've got to go... is bleeding and there's bodies everywhere... you've got to help!*

INJECT 4: MACC radio through to provide casualty updates

MACC (audio): *Information received from Police silver... victims calling from inside station need immediate medical assistance... shooters still in the area... people still alive but bleeding heavily...*

INJECT 5: Phone call from Police Silver to confirm that shooters have escaped and are being pursued by fire arms team (in underground?). Hot zone now declared a warm zone and so casualty evacuation may begin.

Police Silver (audio): *Hi I'm Merseyside Police Force Incident Manager and I'm calling through to confirm that the armed men have now left the immediate vicinity of Lime Street Station... erm our firearms team have not apprehended the offenders as of yet but are in pursuit in the Merseyrail underground... the Wirral line. I'll be back in touch with more information as soon as I have it but, well yeah Lime Street platforms are now Warm not Hot... but as offenders are in pursuit the Police will not be able to assist with evac and packing... I'll be back in touch soon.*

INJECT 6: Radio from MACC to say reports of fire in station pub where saveable life is trapped. Radio message from crew manager to confirm this. A fire has started in the elevated pub in Lime Street Station with persons trapped. Fire service resources are committed to the casualty response at present.

MACC: Update Lime Street Station shooters... reports of a fire from inside 'Coopers' pub bar inside station... bar located above M&S and Burger King... people trapped inside... smoke and flames reported from outside... people shouting for help...

INJECT 7: Additional staff from both Fire and Ambulance arrived at RVP. They do not have the protective ballistic gear which is needed to enter the warm zone. They are volunteering to enter the warm zone without protective gear.

RVP – Station Manager (audio): There's additional resources here at the RVP who are willing to help... fire fighters and ambulance... they've heard the messages and want to be deployed from the FCP... what are the orders from the FCP? They don't have any ballistic gear or protection for going in... your HART team and specialist fire fighters are already in there... what do you want to do?.

INJECT 8A: If committed volunteers at Inject 6 = Chief on phone demanding to know why you've allowed them to enter.

Chief Fire Officer (audio): Am I hearing this right?? You sent volunteers into the station with no ballistics?! What the hell were you thinking? Where's your risk? Save saveable life – don't put our guys into danger without protection – do you know where the shooters are? Did the police say it was a cold zone? What the hell is going on?

INJECT 8B: If did not commit volunteers at Inject 6 = Chief on the phone demanding to know why you did NOT allow them to enter.

Chief Fire Officer (audio): Am I hearing this right?? You've stopped our guys helping deal with casualties?! What the hell were you thinking? Where's your risk? Save saveable life! You've got people dying in there and we've got staff willing and able to help! What the hell is going on?

INJECT 9: A Gold meeting has been called for 11:00. Fire silver liaison needs a situation update to give to gold.

Fire Silver Liaison (audio): Hi it's station manager Thompson – I'm your fire silver liaison today and need to get an update asap... there's been a Gold SCG called and we need a joint situational update... what's your brief?

Appendix Six: Information sheet for Hydra simulation

INFORMATION SHEET

Developing and Understanding Emergency Service Decision Making through Simulation Based Training Events

What is the research?

You have been asked to take part in research looking at how the emergency services make decisions when responding to emergency incidents.

What will I have to do?

You have been asked to take part in a simulation based training event. As with the previous training events you have experienced, you will be asked to treat the event as if it was a real incident and respond as you would do in the real world.

What are you measuring?

All data gathered during the training event will be about decision making. Measures will include a questionnaire to measure individual differences in decision making style; decision logs taken during incident response; a questionnaire following the incident asking you about your reasons for your decision making; and audio recording.

Am I being tested?

No – you are NOT being tested. All information you provide will be made completely anonymous. Questionnaires will be coded with a participant number to ensure confidentiality. Video or audio recordings during the live event or interviews will be transcribed and made anonymous. Hard copies will be kept solely by the researcher in a locked safe and access will NOT be given to any other parties.

Will my data be passed on to my superiors?

No – all information will be kept completely anonymous. The researchers will NOT pass on any personal information to your organization or any external party. The data gathered is for research purposes only.

Do I have to take part?

No – your participation is completely voluntary. You are also free to withdraw from the research at any time should you decide that you no longer wish to take part.

Will I benefit from taking part?

Yes – the research is designed to work alongside your standard training. Not only is the simulated training designed to be fun, challenging and immersive, but it has also been developed with assistance from your training coordinators to make sure that it is realistic and beneficial to your learning.

How will the research be used?

Research will be used to assist in understanding how emergency services make decisions in the real world. It will be used to help improve emergency services decision making to allow responders to make more robust and confident decisions in challenging environments.

Appendix Seven: Information form provided to each agency at start of simulation

Task - Police

- It is Wednesday 8th October 2014. Time is 0800. Weather is now.
- You are at your office.
- Control have received reports of 3 men who have opened fire with automatic weapons at Lime Street Station.
- You have been mobilised to the **RVP** at Smithdown Lane where you will be **co-located** with your colleagues from the fire and police services
- You are the **on scene incident commander** for the police service
- Resources: You have 4 ARVs en route with an additional 4 ARVs being recalled from training.
- You have an ETA of 5 minutes. Take this time to think about your initial priorities and objectives.

Task – Fire and Rescue Service

- It is Wednesday 8th October 2014. Time is 0800. Weather is now.
- You are at your office.
- Control have received reports of 3 men who have opened fire with automatic weapons at Lime Street Station.
- You have been mobilised to the **RVP** at Smithdown Lane where you will be **co-located** with your colleagues from the police and ambulance services
- You are the **on scene incident commander** for the fire and rescue service.
- Resources: You have 10 fire and rescue personnel en route from the Search and Rescue Team
- You have an ETA of 5 minutes. Take this time to think about your initial priorities and objectives.

Task - Ambulance

- It is Wednesday 1st October 2014. Time is 0800. Weather is now.
- You are at your office.
- Control have received reports of 3 men who have opened fire with automatic weapons at Lime Street Station.
- You have been mobilised to the **RVP** at Smithdown Lane where you will be **co-located** with your colleagues from the fire and police services
- You are the **on scene incident commander** for the ambulance service.
- Resources: You have 6 ambulance personnel en route and an additional 6 being recalled from training
- You have an ETA of 5 minutes. Take this time to think about your initial priorities and objectives.

Appendix Eight: Questionnaire given to participants at the end of the simulation

Section A

Please provide the following information about yourself by placing an 'X' in the appropriate box or write your answer in the space provided.

Are you male or female?

☐

Male

☐

Female

What is your age (in years)?

<20

☐

21-25

☐

26-30

☐

31-35

☐

36-40

☐

41-45

☐

46-50

☐

51-55

☐

56+

☐

Which agency do you work for?

What is job title?

How long have you held this role?

Years

Months

How long have you been in your job in total?
Months

Years

Did you already know anyone in your decision making team because you had met or worked with them before? Place an 'X' in the box that represents their agency.

☐

Police

☐

Fire and Rescue

☐

Ambulance

Section B

Think about your general decision making. Please score your level of agreement with the following statements using the following scale:

Strongly disagree (1)
agree (6)

←—————→

Strongly

Statement	Score (1-6)
I think that having clear rules and order at work is essential for success	
Even after I've made up my mind about something I am always eager to consider a	

different opinion	
I don't like situations that are uncertain	
I dislike questions which could be answered in many different ways	
I like to have friends who are unpredictable	
I find that a well ordered life with regular hours suits my temperament	
When dining out, I like to go to places where I have been before so that I know what to expect	
I feel uncomfortable when I don't understand the reason why an event occurred in my life	
I feel irritated when one person disagrees with what everyone else in a group believes	
I hate to change my plans at the last minute	
I don't like to go into a situation without knowing what I can expect from it	
When I go shopping I have difficulty deciding exactly what it is that I want	
When faced with a problem I usually see the one best solution very quickly	
When I am confused about an important issue I feel very upset	
I tend to put off making important decisions until the last possible moment	
I usually make important decisions quickly and confidently	
I would describe myself as indecisive	
I think it is fun to change my plans at the last moment	
I enjoy the uncertainty of going to a new situation without knowing what might happen	
My personal space is usually messy and disorganised	
In most social conflicts I can easily see which side is right and which is wrong	
I tend to struggle with most decisions	
I believe that orderliness and organization are among the most important characteristics of a good student	
When considering most conflict situations I can usually see how both sides could be right	
I don't like to be with people who are capable of unexpected actions	
I prefer to socialise with familiar friends because I know what to expect from them	
I think that I would learn best in a class that lacks clearly stated objectives and requirements	
When thinking about a problem, I consider as many different opinions on the issue as possible	
I like to know what people are thinking all the time	
I dislike it when a person's statement could mean many different things	

It's annoying to listen to someone who cannot seem to make up his or her mind	
I find that establishing a consistent routine enables me to enjoy life more	
I enjoy having a clear and structured mode of life	
I prefer interacting with people whose opinions are very different from my own	
I like to have a place for everything and everything in its place	
I feel uncomfortable when someone's meaning or intention is unclear to me	
When trying to solve a problem I often see so many possible options that it's confusing	
I always see many possible solutions to problems I face	
I'd rather know bad news than stay in a state of uncertainty	
I do not usually consult many different opinions before forming my own view	
I dislike unpredictable situations	
I dislike the routine aspects of my work	

Section B2

Please use the scale below to indicate the extent to which you agree or disagree with the following statements.

Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7

Statement	Score
I am good at "sizing up" situations	
I have a hard time making decisions when faced with difficult situations	
I consider multiple options before making a decision	
When I encounter difficult situations, I feel like I am losing control	
I like to look at difficult situations from many different angles	
I seek additional information not immediately available before attributing causes to behaviour	
When encountering difficult situations, I become so stressed that I cannot think of a way to resolve the situation	
I try to think about things from another person's point of view	
I find it troublesome that there are so many different ways to deal with difficult situations	
I am good at putting myself in others' shoes	
When I encounter difficult situations, I just don't know what to do	

It is important to look at difficult situations from many angles	
When in difficult situations, I consider multiple options before deciding how to behave	
I often look at a situation from different viewpoints	
I am capable of overcoming the difficulties in life that I face	
I consider all the available facts and information when attributing causes to behaviour	
I feel I have no power to change things in difficult situations	
When I encounter difficult situations, I stop and try to think of several ways to resolve it	
I can think of more than one way to resolve a difficult situation I'm confronted with	
I consider multiple options before responding to difficult situations	

Section C

Section C1:

Indicate the degree to which you agree with each statement by using the following scale:

Disagree strongly	Disagree	Neutral	Agree	Agree Strongly
1	2	3	4	5

Statement	Score (1-5)
One should be very cautious with strangers	
Most experts tell the truth about the limits of their knowledge	
Most people can be counted on to do what they say they will do	
These days, you must be alert or someone is likely to take advantage of you	
Most salespeople are honest in describing their products	
Most repair people will not overcharge people who are ignorant of their speciality	
Most people answer public opinion polls honestly	
Most adults are competent at their jobs	

Section C2:

Please use the scale below to indicate the extent to which you agree or disagree with the following statements. Think specifically about the individuals that you have just worked with and provide a score for each agency. If you were the only representative from your own agency please leave that column blank.

Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7

Statement	Police	Fire	Ambulance
I trust ... because they share the same interests as me			
I trust ... because they share my expectations and goals of the project			
I don't trust ... because they have a different communication style from me			
... work values are not very similar to mine			
In their job ... seems to work efficiently			
I have full confidence in the skills of ...			
... does not perform their tasks with skill			
I cannot rely on the task-related skills of ...			
Even if I didn't ask ... to share knowledge with me I feel certain that they would			
I feel that ... keeps information from me			
... does not pass information or ideas on that can be helpful to you or the team			
... timely shares any relevant information			
If I share my problems with ... they will respond constructively and caringly			
... does not keep my interests in mind when making decisions			
... cares about the well-being of others			
... is primarily interested in their own welfare			
If I give ... confidential information they keep it confidential			
... does not tell others about things if I ask that they be kept secret			
I lack confidence in the overall discretion of			
... talks too much about sensitive information that I give them			
Even in hard working circumstances I can count on ... to follow through on work commitments			
In the face of difficulties I can count on ... to solve problems and meet work commitments in time			
In difficult working circumstances ... fails to follow through on			

work commitments			
When encountering problems ... lacks the courage to constructively start working on them			
I can rely on ... not to make my work more difficult by careless work			
I feel that ... tries to get out of their work commitments			
... would go on with their work even if nobody checked it			
... readily denies responsibility for problems incurred by their mistakes			

Section D

Section D1:

Please think about the scenario you have just completed and score each statement:

Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7

Statement:	Score
The narrative of the incident felt realistic to me	
Decision making was high risk	
I am confident in the actions that I took	
I felt that my understanding of the situation throughout the incident was accurate	
I found decision making to be complex	
I was uncertain about my potential options	
I felt time pressured	
I was confused about my roles and responsibilities	
I was worried about being held to account for my decisions	
I was worried about being blamed for wrong decisions	
I was worried about regretting my decisions in the future	

Section D2:

Please answer the following questions by placing an 'X' in the relevant box or writing your answer in the space provided.

Please list in order your main three goals during the scenario (from most important)?

1

2

3

What decision did you find most difficult to make? Why?

Do you believe that this decision could have been made more quickly than it was?

YES

☐

NO

☐

Why? Why not?

When making this choice, did you experience any of the following? Please use the scale below.

Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7

Statement	Score
I was constantly trying to find an optimal solution to the problem	
I wanted to wait and see what happened	
I wanted to gather more information	
I felt that I missed an earlier better opportunity to take action	
I was concerned about wasting previously invested resources	
There were too many options to pick between	
I decided to focus on easier tasks first	
There were not enough options to pick between	
Goals between agencies were inconsistent	

END OF QUESTIONNAIRE