Understanding and Managing Bias

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A large amount of evidence, mostly from research in psychology, suggests that decision-making and information processing abilities are often not optimal because the informational complexity of the world overwhelms human cognitive abilities and creates bias. This is exacerbated by contextual pressures, such as time constraints, dynamism and changing goals. Our aim in this chapter is to identify some of the key cognitive biases that contribute to uncertainty, as well as emerging mechanisms to manage them. We also discuss the importance of promoting realistic expectations of the police and security services in their responses to such uncertainty.

While these issues are relevant to all types of serious crime investigations they are exacerbated in counterterrorism investigations, which involve both inherent and created uncertainties, as well as significant time pressure and high stakes. While the inherent uncertainty in terrorists' motivations and actions cannot be easily influenced, the management of counterterrorism operations can have a direct influence on the amount of uncertainty that is introduced to the situation through strategies for decision-making and information interpretation.

To keep within the confines of this chapter, we have been selective in the issues we address, predominantly focusing on counterterrorism operations, but also drawing on knowledge about understanding and managing bias in other types of serious crime. It is important to note that this is not a comprehensive review of the role of bias in creating uncertainty but rather an insight into an area that requires attention.

In a counterterrorism operation decisions regarding intelligence collection, interpretation of available information and courses of action are made in a context characterised not only by time pressure and high stakes, but also severe data limitations, data overload, ill-structured tasks, risk, shifting and competing goals, dynamism, action feedback loops, group work and external and public oversight, all of which create uncertainty (Zsombok & Klein 1997). In such circumstances, the applicability and feasibility of time-intensive, analytical decision-making methods is reduced and counterterrorism operation members may be forced to rely more on faster intuitive and heuristic based methods (Hammond 2007). Heuristics are cognitive short cuts to reduce

complex problems into simple rules that work effectively. While heuristics can be adaptive, they can also lead to biases and inaccuracies (Almond et al. 2008; Slovic et al. 1977). As we describe, heuristic use in counterterrorism operations can be both adaptive and maladaptive.

There are a number of cases on the public record where the police and security services have been successful in identifying terrorists. For example, in Australia 17 terrorists have been successfully convicted without a terrorist attack occurring on Australian soil (Porter & Kebbell 2009). However, let us consider two examples where bias has been critical in counterterrorism operations, each illustrating different challenges: errors in the use of information resulting in a false negative where individuals of high risk were rated as low risk and errors that facilitated over-responding to intelligence whereby individuals of low risk were rated as high risk. Operation Crevice provides an example of the first of these challenges. It was an investigation into a terrorist plot to bomb a shopping centre in England that generated a body of information that required virtually the entire operational resources of MI5 to process. This included the analysis of the results of searching 30 addresses, 45,000 hours of monitoring and transcription, 34,000 hours of surveillance, and 4,020 telephone calls (Intelligence and Security Committee 2009). Such an enormous volume of information potentially overwhelms the cognitive abilities of individuals, increasing the likelihood that heuristics are used and thus increasing the potential for bias. One such maladaptive bias involved overlooking important information which led to a failure to investigate two terrorists. The two men, Mohammed Siddique Khan and Shazad Tanweer, were associated with the terrorist cell under surveillance and subsequently attacked London on 7 July 2005 (Intelligence and Security Committee 2009).

The mistaken shootings of Mohammed Abdulkahar in Forest Gate, London, UK (Independent Police Complaints Commission 2007a) and Jean Charles de Menezes in Stockwell, London, UK (Independent Police Complaints Commission 2007b), as well as the detention and subsequent release of Mohammed Haneef in Brisbane, Australia (Clarke 2008) indicate the problem of identifying people as terrorists when there is not sufficient evidence to prove a case. Cognitive biases can contribute to such mistakes, hence the importance of recognising and managing these biases in counterterrorism operations.

Here we first examine a selection of heuristics and cognitive biases, and provide examples of how they are relevant to counterterrorism operations. We then present a number of strategies for debiasing, or reducing the effects of these biases. Many of these debiasing techniques do not seem to have been empirically examined in the context of counterterrorism policing, however they have the potential to help mitigate against biases in this field.

Key heuristics and biases

The literature on heuristics and biases is voluminous and only a selection is discussed here (for a more detailed review see Almond et al. 2008). As previously mentioned, heuristics can help to navigate the complexity of decision-making in counterterrorism operations and it is important to note that their use can have positive or negative impacts, including the production of biases, depending on the circumstances. In this section we discuss the representativeness heuristic, the availability heuristic, anchoring and adjustment, confirmation bias and hindsight bias, providing examples of their positive and negative influences on counterterrorism operations and other serious crime.

The *representativeness heuristic* is a mental short cut which allows judgments to be made about a person or event based on perceived similarity to a particular known group or event (Tversky & Kahneman 1974). This heuristic can be adaptive, allowing intelligence operations to move forward in the face of ambiguous and potentially deceptive information, by allowing analysts to rely on knowledge about similar situations or offenders. This heuristic can also be maladaptive when reliance on this mental short cut leads to subsequent decisions being made largely on the basis of false assumptions. Mears and Bacon (2009) discuss this as a form of ‘attribution error’ that is common in medical decision-making. An example can be seen in Operation Crevice where Mohammed Siddique Khan and Shazad Tanweer appear to have been thought of as criminals rather than terrorists because of their conversational references to criminal activities (Intelligence and Security Committee 2009).

The *availability heuristic* leads to information that can quickly be brought to mind gaining more prominence than other equally valid evidence (Tversky & Kahneman 1974). This heuristic can be advantageous when the most relevant information for a task is more available than peripheral information, leading to accurate decision-making. On the other hand, information overload is a recognised problem in complex counterterrorism operations and the availability heuristic may lead to more recent evidence being given more weight than is justified. If equally important older evidence cannot easily be recalled by investigators this may lead to error. In light of the increased attention and concern surrounding terrorism and its perpetrators, greater amounts of information are collected, and the likelihood that the availability heuristic will be unconsciously utilised to handle data overload also increases. The sheer volume of information that springs from national security hotlines, terrorist propaganda, covert intelligence collection and informants already creates a significant challenge for analysis, and the availability heuristic may lead analysts to incorrectly privilege information simply because it is recent and easily recalled, rather than because of its inherent importance.

A plausible negative influence of the availability heuristic can be seen in the shooting of Jean Charles de Menezes (Independent Police Complaints Commission 2007b). The four London suicide bombings 15 days previously that killed 56 people and injured over 300, the unsuccessful attempted detonation of four suicide bombs the previous day, and the fact that the bombers were at large, may have made the threat of suicide bombings particularly available in the minds of officers.

Anchoring and adjustment is a heuristic which involves an individual selecting a starting point (anchor) and then gradually adjusting that point as new information requires it (Tversky & Kahneman 1974). Some examples of anchors in counterterrorism operations may include a potential risk that a suspect poses or the level of risk that an attack will occur.

These anchors may evolve from an individual's previous experience or from a partial assessment of the facts. Adjustment occurs as more information is assessed or becomes available, however research suggests that these adjustments are often not enough (Tversky & Kahneman 1974). For example, with regard to the shooting of Jean Charles de Menezes the starting point concerning his likelihood of being a suicide bomber appeared to be assessed as high. Research suggests that police often adopt a 'guilt bias', where they act as if a suspect is guilty, rather than being innocent until proven guilty (e.g. Leo 2008), which is an example of anchoring. If the default anchor is guilt, adjustments from evidence that supports the suspect's innocence may be insufficient. Thus whilst anchoring may allow an operation to move forward without a constant need to be re-assessed, adjustments may not adequately allow for exonerating evidence or incriminating evidence on other potential suspects to be revealed.

Confirmation bias leads to information that is consistent with expectations being sought and information that is contradictory being ignored or devalued (Cook & Smallman 2008; Klayman & Ha 1987; Wason 1960). In an experimental study with detectives, Ask and Granhag (2005) found evidence of confirmation bias in the form of misinterpretation of evidence to support the initial hypothesis. In their study detectives were provided with scenarios in which a murder suspect looked either more or less guilty. They were then given ambiguous witness evidence, and the evidence was generally interpreted in a manner indicative of guilt in the high guilt condition and less so in the low guilt condition.

In counterterrorism operations, intelligence analysts may make assumptions about factors such as terrorist cell construction or typical perpetrator features and may seek confirmation of these leads without considering alternative possibilities—particularly if they have made a commitment to a course of action based on these assumptions. Confirmation bias potentially affected the Haneef

case (Clarke 2008), in that ambiguous information, such as Dr Haneef booking a one-way ticket to India, was interpreted as indicating his involvement in a terrorist plot.

Hindsight is the retrospective view of events and how they unfolded; *hindsight bias* describes overestimation of how easy it should have been to be successful and oversimplification of what should have been done (Fischhoff 1975; Hawkins & Hastie 1990). This has been a particularly prominent issue in counterterrorism operations which often result in post-operational reviews, frequently with some degree of political motivation. Such reviews are likely to be affected by hindsight bias, in which it is difficult, and arguably impossible, to ignore the effect of later information on a decision made in the absence of that information. Hindsight bias has been a significant public issue in cases such as the London bombings and the Haneef case, where—with the benefit of hindsight—commentators have been extremely critical of the police response. This has impacted on the procedures, policies and practices of future operations and thus is of critical importance. We return to this bias in our conclusions.

Thus far it has been shown that while the use of heuristics can help to reduce the amount of uncertainty and complexity in counterterrorism operations, it may also result in biases that cause errors. As these processes are inherent in human cognition they are difficult to avoid. However, some methods may minimise problems associated with heuristics and biases. We now turn to ways of debiasing.

Mechanisms for debiasing

Given that cognitive biases are such a persistent challenge it is important that, in a counterterrorism operations environment, attention is focused on removing or minimising these effects. Wilson and Brekke (1994) divide biases into two groups, one of which is characterised by uncontrollable mental processes (such as cognitive biases) and the other being failure of rule knowledge or application (applying the wrong rule leading to the wrong conclusion). Thus one way of debiasing is for individuals to be aware of the magnitude and direction of the bias, and motivated to correct for it. However this will only work where the bias is actually controllable (Wilson & Brekke 1994). In the case of counterterrorism operations, this method involves increasing awareness of bias and reducing bias by ensuring team members at all levels are consciously aware of heuristics they may use, and the biases that may result from these, and how this relates to their work. Creating awareness of biases is an important component of training and

must be supported through organisational culture. Improving the metacognition, or extent to which members are aware of their thinking, is a vital strategy for providing opportunities to reduce damaging biases during operations.

There is some question as to whether simple awareness of the potential for bias alone is likely to be successful at reducing biases, which generally operate at an unconscious level (Wilson & Brekke 1994). For this reason explicit debiasing strategies may be adopted. Some examples utilised in law enforcement and national security include visualisation, the analysis of competing hypotheses, key assumptions check, structured decision-making, red-teaming, devil's advocate, Team A/Team B, and scenario development. We provide a brief overview of the first four.

Visualisation can be used to keep uncertainty explicit, which is important for reducing bias at both analyst and decision-maker levels of counterterrorism operations. At the analyst level, relying on recent or easily retrieved information and seeking only confirming evidence can be avoided by using visualisation programs to keep all important information visible. At the decision-maker level, products used to assist decision-making should have explicit recognition of where levels of uncertainty regarding information are high or data is lacking. Without this clarity, courses of action may rely on false assumptions drawn from unclear intelligence. Visualisation tools are a good example of how uncertainty can be made explicit for both levels. Analysts may use visualisation programs to keep disconfirming evidence, probabilities of deception, and amounts of supporting information in front of them to help reduce the likelihood of this information being lost in data volume. At the decision-maker level, intelligence products that visually present the information, uncertainty and missing information may also reduce the likelihood that the individual will work from false assumptions.

Although it is not often presented as a debiasing strategy, visualisation software is increasingly being used as an aid to the analysis of criminal intelligence and investigative case management (Dean & Gottschalk 2007). Research has demonstrated that, in some situations, visualisation techniques can be an effective strategy for reducing confirmation bias in the assessment of intelligence (Cook & Smallman 2008). Due to the intuitive appeal of visual representations of complex data, it is likely that many other such approaches exist in law enforcement. The debiasing potential of such systems, many of which are already in place, is an obvious area for further research into mitigating the effects of cognitive biases.

Several methods of keeping uncertainties explicit exist as 'tradeecraft' for intelligence analysts (Central Intelligence Agency 2009). These include methods such as the Analysis of Competing Hypotheses and Key Assumptions Check. The Analysis of Competing Hypotheses (Heuer, 1999) has been advocated for the understanding of intelligence, particularly when the consequences of error are

likely to be high. It has also been found to reduce the likelihood of confirmation bias (Cheikes et al. 2004; Billman et al. 2006). This procedure consists of eight systematic steps that can be applied to an analytical problem to encourage good decision-making:

1. identifying different hypotheses about what is happening in the domain of interest. Heuer suggests that the more uncertain a situation is, and the greater the impact of a decision, the more alternative scenarios should be hypothesised
2. making a list of the significant evidence and arguments for each hypothesis
3. refining the hypotheses into a matrix with evidence that is assessed for the degree to which it supports the arguments
4. deleting the evidence that has no diagnostic value
5. developing tentative conclusions about the relative likelihood of each hypothesis and trying to find evidence to *disprove* hypotheses rather than proving them
6. assessing the sensitivity of the conclusions to a few sources of evidence, with the implication being that if those sources of evidence are incorrect or subject to a different interpretation then the conclusions may be wrong
7. reporting conclusions that will include not only the most likely conclusion but also alternatives
8. articulating what evidence should be collected in the future to ensure that their assessments are not being deviated from.

A related technique to the Analysis of Competing Hypotheses is the Key Assumptions Check. This involves reviewing the current intelligence line on an issue and articulating all the premises that are accepted as true for this analytic line to be valid. Then the analyst is encouraged to challenge each assumption and its validity. Finally, the analyst must consider under what conditions these assumptions might not hold. Empirical evaluation of this technique in this domain is, to our knowledge, yet to be conducted.

Other methods concern providing counterterrorism operations with structured methods of decision-making that prompt individuals, at all levels, to consider uncertainties in the situation. As previously discussed, the contextual features of counterterrorism operations, particularly uncertainty, induce heuristic-based decision-making. By providing counterterrorism operations with structured methods of decision-making, heuristic use is complemented with some level of analysis and consideration of alternatives. To date, however, most research in a forensic context has looked at structured decision-making from a correctional, rather than counterterrorism perspective.

For example, the Static-99 is a tool used for assessing the risk of future sex offending in convicted sex offenders and is calculated using historical, fixed (or static) factors: personal demographic information, official criminal history, and the gender of and relationship to victims. This procedure is reasonably accurate, though far from perfect, and typically outperforms clinical judgment (Beauregard & Mieczkowski 2009; Grubin 1998; Sjöstedt & Långström 2001) because it removes many of the factors associated with bias, including those involved in making judgments that do not relate to risk, such as how likeable or attractive the individual is, how friendly they are to the assessor, and whether they fulfill the assessor's stereotypes of an offender. As mentioned previously, availability, representativeness, anchoring and adjustment as well as a variety of other heuristics also have the potential to add to bias. Structured decision-making is a more objective way of looking at data that can encourage a more systematic and critical exploration of information in counterterrorism situations, and overlaps with other ways of encouraging critical assessment.

To date however, structured decision-making does not seem to have been empirically evaluated to any significant extent in this domain. Some important advantages of the structured decision-making approach are that it provides an evidence base and audit trail for the decision-making process and it can be designed to ensure consistency of judgments. This allows different people to assess information in the same coherent way and allows for an audit trail to be formed of decisions that are made. This is an important issue in counterterrorism operations where decisions and actions are often scrutinised in hindsight, should events be controversial.

Promoting realistic expectations

Whilst good decision-making in counterterrorism operations is clearly important, it must be borne in mind that analysts and decision-makers have many competing demands. For example, while the best strategy from an analytical perspective might be to collect, collate and analyse more information, the public may require rapid demonstrable action to be taken and, from a leadership perspective, police and security officers may need to be kept active and motivated. Furthermore, in many situations, perhaps most obviously illustrated in the case of imminent terrorist attack, time-pressure means that the option to delay decision-making is not available. Thus, it is essential that the public are able to understand the complexity of the demands in counterterrorism operations and are also aware of hindsight bias. The Intelligence and Security Committee (2009, p.5), writing about the London bombings, put it well in their comments about what it was reasonable to have known beforehand:

We have concentrated on what information was available at the time of CREVICE and before the 7/7 attacks. Although it is always easy, with the benefit of hindsight, to criticise decisions made in the past, we have looked at what was known and what should have been known prior to the attacks.

Unfortunately the press and public do not always adopt a similar level of realistic expectations.

Conclusions

Complex criminal investigations such as counterterrorism operations have considerable risk of maladaptive cognitive biases and as such there is a need for an awareness of these biases and strategies to manage them. A great deal of uncertainty exists in gathering, collating, analysing and acting on intelligence in counterterrorism operations and, as a result, bias may exist in the interpretation of this information. The consequences of mistakes in such operations range from merely being ineffective in the use of taxpayers' money, to loss of life by failing to identify and prevent terrorist actions. More structured ways of thinking have significant potential to enhance effective management of uncertainty resulting from cognitive bias. Nevertheless, with the always limited resources of investigating agencies, there is a trade-off between continuing to collect information that might lead to identifying more suspects and reveal more crimes, or focusing attention on those that are known. Here the police and security services tread a fine, difficult, and uncertain line.

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