

Managing Bias: Dealing with Uncertainty in Counter-terrorism Intelligence

Analysis

Mark R. Kebbell

ARC Centre of Excellence in Policing and Security

Griffith University

Damon Muller

ARC Centre of Excellence in Policing and Security

The Australian National University

Kirsty Martin

ARC Centre of Excellence in Policing and Security

Griffith University

Cognitive biases lead to critical forms of uncertainty, which must be managed in the investigation of serious crime. Here we focus on their occurrence in counter terrorism investigations, which involves both inherent and created uncertainty. Dealing with such uncertainty in a time pressured, dynamic and high-stakes context can lead to error. While the inherent uncertainty in terrorists' motivations and actions cannot be easily influenced, the management of counter terrorism 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.

COUNTER TERRORISM INVESTIGATIONS AND UNCERTAINTY

Operations against terrorist plots always include a degree of uncertainty. Indeed, it can be argued that one of the key factors that terrorists use to create fear is the uncertainty associated with their activities; people are not aware of when, where, who, or how, they will attempt to attack and this magnifies the terrorists' influence. Despite the fact that terrorists are highly motivated to create conditions of uncertainty, particularly concerning their identities and their intended activities, the police and security services have had many successes in preventing terrorists from achieving their aims. For example, in Australia 12 individuals have been convicted of terrorist offences without a terrorist attack having been committed on Australian soil (Porter & Kebell, 2009). Similarly, in the United Kingdom, the police and security services have, between 11 September 2001 and 31 March 2007, identified 224 people who have been convicted of terrorist or terrorist-related offences and a further 114 are awaiting trial (MI5, 2009)

Nevertheless, in both the Australia and the United Kingdom there have been controversial cases where the police and security services were required to respond to

uncertain circumstances and have been heavily criticised for their response, in part at least, because of problems with intelligence analysis. In Australia, the highest-profile case has been *R. v. Haneef*, a case concerning a doctor associated with terrorist plots in the United Kingdom, who was suspected, but not convicted, of terrorist offences in Australia (for a full review see Clarke, 2008). In the Australian case the police and security services were mainly criticised for a over-responding to intelligence concerning a perceived threat. In the United Kingdom the suicide attacks of the 7th of July 2005 have proven controversial for the opposite reason; the police and security services have been criticised for not paying enough attention to a threat. This is in light of disclosures by the Security Service (MI5) that two of the suicide bombers, Mohammed Siddique Khan and Shazad Tanweer, had been under surveillance because of their association with Mohammed Qayum Khan, a terrorist already known to be planning a large-scale bombing (Intelligence and Security Committee, 2009).

A large amount of evidence, mostly from research in psychology, suggests that our decision making and information processing abilities is often not optimal because of contextual pressures (such as time constraints, dynamism, changing goals) and the informational complexity of the world overwhelm our cognitive abilities and create bias. Many of the factors that may create bias potentially are present in many of the tasks which are central to a complex counter-terrorism operation, particularly in relation to the role of intelligence in collecting information and making decisions on the basis of that information. Our aim in this chapter is to identify some of the key cognitive biases and heuristics that contribute to uncertainty, emerging mechanisms that may facilitate the management of these uncertainties, and realistic expectations of the police and security services in their responses to such uncertainty. We focus our discussion using the intelligence analysis environment with regard to counter-

terrorism operations. To keep within the confines of this chapter, we have been selective in the issues we address. It is important to note that this is not a comprehensive review of uncertainty in intelligence analysis for counter terrorism operations but rather an insight into an area that requires attention.

Decisions regarding intelligence collection, interpretation and courses of action are made in a context characterised not only by uncertainty, but also often by time pressure, severe data limitations, data overload, ill-structured tasks, high stakes and risk, shifting and competing goals, dynamism, action feedback loops, group work and external and public oversight (Zsombok & Klein, 1997). In such a context the applicability and feasibility of time-intensive, analytical decision making methods is reduced and counter terrorism operation members may be forced to rely more on faster intuitive and heuristic based methods (Hammond, 2007). While heuristics can be an adaptive function when successful, they can also lead to biases and inaccuracies (Slovic, Fischhoff & Lichtenstein, 1977). Counter terrorism operations provide a number of opportunities for this to occur in both the adaptive and maladaptive form.

Operation Crevice was an investigation into a terrorist plot to bomb a shopping centre in England. The investigation 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. Clearly such an enormous volume of information has the potential to overwhelm the cognitive abilities of any organisation and increases the likelihood of bias or oversight. One such oversight included not investigating two terrorists, Mohammed Siddique Khan and Shazad Tanweer, who were associated with the terrorist cell and subsequently attacked London on the 7th of July, 2005 (Intelligence and Security Committee, 2009).

In a more dynamic environment, the mistaken shooting of Mohammed Abdulkahar in Forest Gate, London (IPCC, 2007) indicates the problem assessing the accuracy of intelligence and events in a time-pressured, ambiguous environment. Cognitive biases can contribute to such mistakes, hence the importance of recognising and managing these biases in a counter terrorism operation.

HEURISTICS, BIASES AND DEALING WITH UNCERTAINTY

Cognitive biases may have significant impact on the evidence collection and evaluation in a major counter-terrorism investigation and are going to be difficult to avoid with the volume of information available in operations like Crevice. In these instances human cognitive processing contains a collection of cognitive “short cuts”, or heuristics. The literature on heuristics and biases is voluminous and as such only a selection of the most important of those likely to occur in counter terrorism context is discussed. These heuristics may create biases that may not necessarily be recognised by investigators, but create uncertainty in the reliability of the investigation.

The *representative heuristic* results in judgements being made because of the perceived similarity to a particular group, rather than objective criteria (Tversky & Kahneman, 1974). This heuristic can be adaptive, allowing intelligence analysis to move forward in the face of ambiguous and potentially deceptive information as they can rely on knowledge about similar situations or offenders but this heuristic can also be maladaptive. Mears and Bacon (2009) discuss this as a form of ‘attribution error’ that is common in medicine. When such mental shortcuts are inaccurate it may lead to subsequent decisions being made largely relying on that false assumption (anchoring).

The *availability heuristic* leads to information that can quickly be brought to mind gaining more prominence than other equally valid evidence (Tversky &

Kahneman, 1974). Information overload is a recognised problem in complex counter-terrorism operations, and the availability heuristic may lead to more recent evidence being weighted more heavily than equally important older evidence which cannot as easily be recalled by investigators. In light of the increased attention and concern surrounding terrorism and its perpetrators, the likelihood that the availability heuristic will be unconsciously present in counter-terror investigations also increases. The sheer volume of information that springs from national security hotlines, terrorist propaganda, covert intelligence collection and informants already create a monumental challenge for analysis, and the availability heuristic may lead analysts to incorrectly privileging information simply because it is recent or conforms to stereotypes, rather than because of its inherent importance.

Anchoring and adjustment is a heuristic which involves a subject selecting a starting point (anchor) and then gradually adjusting that point as new information requires (Tversky & Kahneman, 1974). Some examples of anchors in counter terrorism operations may include a potential suspect or level of risk that an attack will occur. These anchors may evolve from a subject's previous experience or from a partial assessment of the facts. Adjustment occurs as more information is assessed or becomes available, however some research suggests that these adjustments are often not enough (Tversky & Kahneman, 1974). For example, the anchor may be based on knowledge of previous incidents and, while not taking into account the full information available, it allows the operation to move forward. As more information is analysed or becomes available the counter terror operation members may adjust their initial targeting to include other potential suspects as accomplices whilst maintaining their focus on the original suspect. This adjustment may not be adequate enough to allow for incriminating evidence on other potential suspects to be revealed.

On the other hand, should that initial assessment of the potential suspect be accurate, the heuristic is adaptive as it significantly reduces the resources, time and cognition required to complete the operation.

Confirmation bias leads to information that is consistent with expectations being sought out and information that is contradictory being ignored or devalued (Cook & Smallman, 2008; Klayman & Ha, 1987; Wason, 1960). While this will be problematic in even routine criminal investigations, the breadth of stakeholders who may feel the impact of successful terrorist plots heightens the need for accuracy. When considering the situation, intelligence analysts may make assumptions about factors such as terrorist cell construction or typical perpetrator features and seek confirmation of these leads without considering alternative possibilities. While this may be an adaptive function in that it reduces the information and resources required under time pressure, changes in telecommunications for example have meant that stereotypical terrorist cells are no longer closely knit and physically connected (Cole & Cole, 2009). In an experimental study with detectives, Ask and Granhag (2005; 2007) highlighted a potentially important bias evolving from system factors when they found evidence of confirmation bias in the form of misinterpretation of evidence to support the initial hypothesis..

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 to oversimplify what should have been done (Fischhoff, 1975; Hawkins & Hastie, 1990). This has been a particularly prominent issue in counter-terrorism 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. Whilst hindsight bias does not tend to impact upon the efficacy of the terrorism operation in progress, it has been a significant public issue in cases such as the London bombings and the *Haneef* case, potentially impacting on the procedures, policies and practices of future operations and thus deserves mention.

Some biases and heuristics are more insidious, problematic, and difficult to mitigate than others. Whilst the use of heuristics can help to reduce the amount of uncertainty in counter-terrorism operations, it may also lead to cognitive biases that create and perpetuate uncertainty. 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 counter terrorism 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 and coming to the wrong conclusion). They argue that whilst it is possible to learn the correct rules to apply, and hence mitigate the latter form of bias, they are pessimistic about the effectiveness of debiasing strategies aimed at combating mental contamination. For debiasing to be successful, subjects must be aware of the magnitude and direction of the bias, must be motivated to correct for it, and the bias must be controllable (Wilson & Brekke, 1994). The focus on cognitive biases and decision making errors that has occurred in recent years with regard to medical decision making (Mears & Bacon, 2009) has parallels and implications for decision-

making in counter terrorism events and these errors are likely to have both instantaneous and cumulative effects, where earlier errors amplify later ones.

One debiasing method is simply increasing awareness of bias and involves reducing bias by ensuring counter terrorism operation members at all levels are consciously aware of heuristics they may use, the biases that may result from these and how this relates to counter terrorism operations. 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 provide opportunities to reduce damaging biases during operations.

Another method of preventing error is keeping uncertainty explicit, which is important for reducing bias at all levels of counter terrorism operations. At the analyst level, subjects must avoid, for example, relying on recent information or easily retrieved information and seeking only confirming evidence. 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 subject will work from false assumptions. Although it is not often presented as a debiasing strategy, visualisation software is increasing 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, 2008).

Several methods of keeping uncertainties explicit exist in as ‘tradeecraft’ for intelligence analysts (CIA 2009). These include methods such as the Analysis of Competing Hypotheses and Key Assumptions check. The Analysis of Competing Hypotheses (Heuer, 1979; 1999) has been advocated for the understanding of intelligence, particularly when the consequences of error are likely to be high. This procedure consists of eight systematic steps that can be applied to an analytical problem to encourage good decision-making.

The first step concerns 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 hypothesized. The second step involves making a list of the significant evidence and arguments for each hypothesis. The third step is a further refinement of these hypotheses into a matrix with evidence that is assessed for diagnosticity of the evidence and arguments. In the fourth step hypotheses and evidence that have no diagnostic value are deleted. In step five the individual is encouraged to develop tentative conclusions about the relative likelihood of each hypothesis and to try to find evidence to *disprove* hypotheses rather than proving them. In step six the individual assesses the sensitivity of their 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 they draw could also be incorrect or subject to error. Step seven concerns the reporting of conclusions that will include not

only the most likely conclusion but also alternatives. Finally, in step eight, individuals are encouraged to articulate 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.

Other methods concern providing counter terror operations with structured methods of decision making that prompt subjects, at all levels, to consider uncertainties in the situation. As previously discussed, the contextual features of counter terrorism operations, particularly uncertainty, induce heuristic-based decision making. By providing counter terrorism operations with structured methods of decision making, heuristic use is complemented with some level of analysis and consideration of alternatives.

A number of decision-support strategies exist under various guises. Perhaps the most extensively validated are some of the risk-assessment tools used in policing and corrective services. 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. Examples are 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.

This more objective way of looking at data can encourage a more systematic and critical exploration of information in counter terrorism situations, and overlaps with other ways of encouraging critical assessment. Some examples of structured techniques to enhance critical thinking and challenge assumptions include: red-teaming, devil's advocate, team A/ team B, and scenario development (CIA, 2009). 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 for different people to assess information in the same coherent way and allows for an audit trail to be formed of decisions that are made, an important issue in counter terrorism operations where decisions and actions are often scrutinized in forensic detail in hindsight, should events be controversial.

For example, in a different context, that of organised crime, the "Project Sleipnir" approach to priority setting developed by the Royal Canadian Mounted Police also features a visual matrix of ratings of risks, capabilities and financial turnover for organised crime and, potentially, terrorist organizations. Due to the intuitive appeal of visual representations of complex data, it is likely that 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.

However, whilst good decision-making in intelligence analysis for counter terrorism operations is clearly important, it must be borne in mind that decision-makers also have other demands. For example, whilst 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-pressures mean time is not available to delay decisions. Thus, it is essential that the public are able to understand the complexity of the demands in counter terrorism operations and are also aware of hindsight bias. The Intelligence and Security Committee (2009) writing about the London bombings put it well with regard to their assessment:

“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.” (p.5)

CONCLUSIONS

Complex criminal investigations such as counter terrorism operations are a prime example of the risk of cognitive biases and the 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 counter terrorism 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 taxpayer’s money, to loss of life by failing to identify and prevent terrorist actions. More structured ways of thinking have tremendous 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. Further there will be advantages to allowing some uncertainties to remain unknown. Here the police and security services tread a fine, difficult, and uncertain line.

REFERENCES

- Ask, K., & Granhag, P. A. (2005). Motivational sources of confirmation bias in criminal investigations: The need for cognitive closure. *Journal of Investigative Psychology and Offender Profiling*, 2, 43–63.
- Ask, K., & Granhag, P. A. (2007). Motivational bias in criminal investigators' judgments of witness reliability. *Journal of Applied Social Psychology*, 37(3), 561-591.
- Beauregard, E. & Mieczkowski, T. (2009). Testing the predictive utility of the STATIC-99: A Bayes analysis. *Legal and Criminological Psychology*, 14(2), 187-200.
- Central Intelligence Agency (2009). *A Tradecraft Primer: Structured Analytic Techniques for Improving Intelligence Analysis*. CIA: Washington.
- Clarke, M.J. (2008). *Report of the Inquiry into the Case of Dr Mohammed Haneef: Volume One*. Commonwealth of Australia: Canberra.
- Cole, J. & Cole, B. (2009).
- Cook, 2008: 60
- Cook, M. B. & Smallman, H.S. (2008). Human factors of the confirmation bias in intelligence analysis: Decision support from graphical evidence landscapes. *Human Factors*, 50(5), 745-754.

Dean & Gottschalk, 2007

Engel and Gigerenzer (2006)

Fischhoff, B. (1975). Hindsight \neq foresight: The effect of outcome knowledge on judgment under certainty. *Journal of Applied Social Psychology*, 18, 93-119.

Goldstein, 2002: 39

Grubin, 1998

Hammond, K. R. (2007). *Beyond Rationality*. Oxford, NY: Oxford University Press.

Hawkins, S. A. & Hastie, R. (1990). Hindsight biased judgments of past events after the outcomes are known. *Psychological Bulletin*, 107, 311-327.

Heuer, 1979

Heuer, Jr., J. R. (1999). *Psychology of Intelligence Analysis*. Government Printing Office.

Intelligence and Security Committee, 2009

IPCC, 2007

Klayman, J., & Ha, Y.-W. (1987). Confirmation, disconfirmation, and information in hypothesis testing. *Psychological Review*, 94, 211-228.

Mears and Bacon (2009)

MI5 (September, 2009). Terrorist plots in the UK.

<http://www.mi5.gov.uk/output/terrorist-plots-in-the-uk.html> accessed 11 September, 2009.

Porter & Kebbell, 2009

R. v. Haneef

Sjöstedt & Långström, 2001

Slovic, P., Fischhoff, B. & Lichtenstein, S. (1977). Behavioral decision theory. *Annual*

Review of Psychology, 28, 1-39.

Snook, 2009: 35

Tversky, A. & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185(4517), 1124-1131.

Wason, P.C. (1960). On the failure to eliminate hypotheses in a conceptual task. *Quarterly Journal of Experimental Psychology*, **12**, 129-140.

Wason, P. C. (1968). Reasoning about a rule. *Quarterly Journal of Experimental Psychology*, **20**, 273-281.

Wilson, T. D. & Brekke, N. (1994). Mental contamination and mental correction: Unwanted influences on judgments and evaluations. *Psychological Bulletin*, *116*(1), 117-142.

Zsombok, C. E. & Klein, G. A. (Eds.) (1997). *Naturalistic decision making*. Mahwah, NJ: Lawrence Erlbaum.