Introduction

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Police have always had to grapple with uncertainties in their investigations of crime, so considerable effort has gone into reducing unknowns by developing technologies, like DNA testing, and procedures, like a record of interview. As crime, especially serious crime, has become more complex and resources have become more stretched it is starting to become evident that reduction cannot be the only approach to uncertainties. But how else can unknowns be tackled?

It turns out that many aspects of understanding and managing unknowns have long been a blind-spot in western intellectual thought (Smithson 1989). However, in recent years, as researchers have increasingly engaged with complex real-world problems, the need to develop richer approaches to uncertainties has become more evident and pressing. Responding to that need is still in early stages. Considerable effort is required to develop a more sophisticated understanding of unknowns, let alone a range of effective options for dealing with them.

One of the central challenges is that—although every complex real-world problem contains many different kinds of unknowns—the way each discipline and practice area handles uncertainty covers only a fraction of the terrain. Further, different kinds of unknowns do not map neatly onto disciplines and practice areas. These limitations were demonstrated in a recent publication, where the insights of 17 disciplines and practice areas (art history, complexity science, economics, emergency management, futures, history, intelligence, law, law enforcement, music, philosophy, physics, policy making, politics, psychology, statistics and theology) were expounded and compared, and where the unknowns involved in responding to communicable disease outbreaks, environmental disturbances and illicit drug use were examined (Bammer & Smithson 2008). That project demonstrated that one way to deal more effectively with the myriad unknowns in social and environmental problems is to bring together different disciplinary experts and practitioners enabling them to learn from each other, as well as to contribute and integrate their insights.

That is the task undertaken by this book, which maps out some of the prime territory for dealing with uncertainties in policing serious crime, as well as reviewing key areas for further development.

This book

The book draws heavily on expertise within the Australian Research Council (ARC) Centre of Excellence in Policing and Security (CEPS), including key practitioners from industry partner organisations, the Executive-in-Residence, Chief Investigators, as well as an Associate Investigator and PhD student. It has also brought in leading contributors from other domains, in a strong partnership between CEPS and other major organisations.

The process used to produce this book involved inviting authors to develop draft chapters, which were circulated to the whole group. Each author was asked to undertake a specific task in line with their expertise, as described in more detail below. The papers were then presented and discussed at a one-day conference which was open to interested participants from the policing and research worlds. After this, the final chapters were written. There were two primary activities designed to integrate the insights. First, four authors were asked to write commentaries reflecting on the other chapters in light of particular aspects of policing practice. The second process is ongoing. Conference participants were asked to document and hand in notes on their own reflections at the end of the meeting. These were collated and circulated and, along with this book, will form the basis for follow-up activities in promising areas.

Sue Wilkinson and Michael Smithson set the scene. Sue Wilkinson describes the major challenges for the profession in responding to serious crime. She shows how crime has changed, especially by exploiting globalisation, as well as by the spread and increasing sophistication of information technologies. She describes modern organised crime as 'international, multilayered, multicultural, highly developed, ambitious, profitable and technologically sophisticated'. Uncertainties are compounded by the unpredictable nature of government priorities and subsequent impacts on resources, lack of inter-operability across jurisdictions and difficulties in cooperating with other countries to fight international crime, as well as differences between countries in legal codes and respect for human rights.

Major developments in research on unknowns are highlighted by Michael Smithson, who also starts to tease out different kinds of uncertainties and their consequences. He specifically describes problems where reduction of uncertainty is not possible or not warranted. He also shows how reducing one uncertainty can increase or generate others. In particular he demonstrates that uncertainties are not always negative, but underpin important forms of social capital like privacy and trust. This has important consequences for reducing uncertainty, which always requires trade-offs, some of which should be avoided.

The next set of authors was asked to describe established areas for dealing with uncertainty and to discuss new trends in applying them to policing serious crime. Robyn Attewell, along with Richard Jarrett and Mark Westcott, focus on recent developments in statistics, while Mark Kebbell, Damon Muller and Kirsty Martin concentrate on developments in psychology for dealing with bias.

Robyn Attewell demonstrates how the basic tools of statistics—descriptive statistics, graphs, geospatial mapping, cluster analysis and process control—have continued to evolve, providing effective insights for dealing with serious crime. She also compares and contrasts policing with public health and medicine to discuss how the evidence base for policing could be improved, as well as the limitations to such developments.

A brief introduction to risk analysis is provided by Richard Jarrett and Mark Westcott, showing that many of the qualitative methods currently in use are open to subjective and inconsistent interpretations. They demonstrate an effective method for quantifying consequences and likelihoods of risks, as well as for combining these assessments. They also take this further by examining different kinds of risks—death, injury and illness; economic; social; environmental; symbolic; external; and reputational—and show how these can be rated and combined, allowing for a rich appraisal of a wide range of situations. It therefore becomes possible to construct much more sophisticated and quantified risk matrices to assist police decision-making about allocation of resources and other responses to serious crime, including terrorism.

Mark Kebbell and colleagues describe how short cuts in thinking are essential for effectively responding to the informational complexity of the world. Heuristics are essential aids to thinking, but can have maladaptive outcomes, including leading to bias. They describe a selection of heuristics and biases relevant to policing, namely the representativeness heuristic, the availability heuristic, anchoring and adjustment, confirmation bias and hindsight bias. They also outline advances in debiasing. They demonstrate the particular pertinence of these issues in counterterrorism investigations, which involve both inherent and created uncertainties, and which are both time pressured and high stakes. They argue for the importance of realistic expectations, highlighting the dangers of hindsight bias in particular, especially in politically charged situations.

The third set of authors come from areas which have significant intersections with policing—the law (the Hon. Tim Carmody SC), politics (the Hon. Carmen Lawrence) and business (Neil Fargher). The purpose of providing introductions to these areas is twofold. First, they highlight differences that throw policing procedures into sharper relief. Further exploration may then open the potential to enhance policing effectiveness, for example, in developing cases for prosecution in the courts and in responding to political pressures. Second,

advances in these areas in dealing with uncertainties may be able to be adapted to policing purposes. For instance new understandings from the commercial world may be applied to make the 'business' of crime fail.

A review of the foremost uncertainties inherent in the practice of criminal law is provided by Tim Carmody. For any serious crime, important uncertainties arise from the language of the law, liability for punishment, court processes and the use of discretion. Luck also plays a role. In the second half of the paper he lays out some challenges in preventing and penalising crimes such as terrorism. It is vital that legal uncertainties are not allowed to undermine the inherent values on which the legal system is based, that civil liberties and individual freedoms are respected and that society's fundamental tenets of democratic government and the rule of law are upheld.

Carmen Lawrence explores the fundamental issue of fear. While a central role of policing is to reduce fear in the community, there is always a temptation for politicians to exaggerate and exploit fear as a path to maintaining power. Pressures from the media, which thrives on the reporting of crime, exacerbate this temptation. She demonstrates how common psychological processes make communities more vulnerable to manipulation through this fear and how evidence and more nuanced arguments can be blocked out.

Business thrives on uncertainty and Neil Fargher provides an introduction to this world. Profit and risk are directly correlated. For a business to succeed risks have to be taken, but risks and other uncertainties also have to be managed. Policing already uses many strategies from business, so it is helpful to stay on top of mechanisms for reducing uncertainties through managing information, accepting uncertainties through scenario testing and exploiting them through sharing and shifting, using mechanisms such as insurance and derivatives. Policing already understands the value of seeing crime as business and is on the look out for up-to-date understanding of factors that make businesses fail, given that this is the fate of most new businesses and that even profitable established businesses can come to grief. For example, the chapter concludes with a tantalising analysis of drug dealing, demonstrating similarities to professional sports and accounting partnerships, where junior employees put up with low pay and high risk for the chance of being extremely well paid if they reach the top. Legitimate businesses may be able to provide new insights into the criminal world.

The final four authors were given the most challenging task, namely to relate all the other insights back to practical policing issues. They were asked to concentrate on an area of practice in which they have particular expertise. Thus Peter Martin deals with undertaking and managing investigations, Tracey

Green and Greg Linsdell with higher education in policing, Steve Longford with capacity building through consultancy work and Alastair Milroy with the work of specialist agencies established to deal with serious crime.

Peter Martin provides insights into the worlds of the investigating officer and investigation manager. Serious crime investigation is a multidisciplinary effort, where a major challenge is dealing with masses of information. He describes processes, honed through experience, which allow the protracted, complex and controversial nature of serious crimes to be dealt with and he highlights the importance of intuition, the tacit knowledge derived from that experience base. He confirms the importance of dealing with bias, not only among the investigating officers, but also among witnesses. He outlines the importance of the authorising environment, which seeks to provide public value through appropriate allocation of resources to give effect to the law and to achieve efficient outcomes. The authorising environment is essentially the legislative and regulatory support for the investigation, which can also have the downside of diverting effort from the investigation to meet political and media needs, such as pressure to achieve results and demands for information about the investigation to be made public prematurely.

Australia's leading role in the growth and development of higher education to meet the needs of modern policing, as well as how policing is increasingly constituting a discipline in its own right, is described by Tracey Green and Greg Linsdell. Helping police deal with uncertainty is central and becomes more sophisticated as police proceed from recruits to senior managers. They describe the value of a 'club sandwich' approach, which combines underpinning knowledge relevant to policing, ongoing research and evaluation, and application; the same principles which are used in medical education. There are three tenets relevant to all layers of the club sandwich, which are critical thinking, analysis and research. They also demonstrate the importance of higher education in helping police to stay abreast of changing demands and to effectively deal with the authorising environment, as well as describing how today's certainties can be critical uncertainties tomorrow. They highlight the importance of police becoming active partners in research designed to improve policing practice, including initiating investigations and being the lead researchers, which is facilitated by masters and PhD programs. They conclude with a case study of the successful combination of the higher order skills provided by higher education in the solving of a cold missing person's case by a multidisciplinary team.

Higher education alone cannot meet all the demands of policing in dealing with the myriad relevant uncertainties, with consultancy services filling an important niche. Steve Longford describes how his business tackles education and research in the critical area of decision-making. In essence, the business aims to increase understanding of how biases impact upon decision-making and

to provide a framework, guidelines and tools that assist with more effective decision-making. He systematically works through decisions and decision processes, including programmable and unprogrammable decisions. He highlights three important biases—cognitive, situational and personal—and describes an inverse correlation between uncertainty and confidence, which he argues must be dealt with by concentrating on uncertainty, not confidence. He describes a range of approaches important for mitigating uncertainty, especially problem-solving; critical thinking; open mindedness; differentiating emotion from reason; arguing from knowledge not ignorance; differentiating between possibility, probability and certainty; as well as between intelligence and evidence; applying Occam's razor; and understanding anchoring. He also examines decision quality, including false positive and negatives.

Alastair Milroy concludes the book with a law enforcement agency perspective. The aim of an organisation like the Australian Crime Commission is to bring together all arms of law enforcement intelligence gathering to unite the fight against serious criminal activities. The challenges that such organisations face include lack of accurate and comprehensive statistics about serious crime; lack of agreement across jurisdictions about priorities; jurisdictional differences in legislation, operating standards, powers and cultures that impede collaboration; and turf wars between agencies and professional groups. An operation against an Asian criminal drug syndicate is used as a case study, where both information gaps in some areas and information overload in others were challenges. Despite the difficulties, the operation had marked successes. But as Alastair Milroy points out a significant uncertainty remains: 'While the task force followed the investigative plan, met key performance indicators, stayed within budget, achieved substantial arrests and charges, the overall impact on serious crime will never be known'.

Each of the authors emphasises the importance of bridging the chasm between research and practice. They identify key areas of intersection between practice concerns and research efforts, as well as areas critical to uncertainty in practice that warrant further research.

Moving forward

There is a long way to go before understanding and managing unknowns takes its rightful place in research and practice effort on complex real-world problems, including the policing of serious crime. There are at least five major challenges which an expanded consideration of unknowns must deal with:

1. appreciating that unknowns are infinite, but research capacity is finite
2. responding to heightened awareness of what we do not know, as what we know increases

3. overcoming the fact that no discipline or other area of intellectual endeavour has the mandate to take an overarching view of unknowns
4. avoiding three problematic responses: a) overconfidence, b) nihilism and despair, and c) providing a hiding place for corruption and incompetence, and
5. agreeing on terminology.

Let us discuss each of these in turn.

Appreciating that unknowns are infinite, but research capacity is finite

There are at least four reasons why unknowns are unlimited:

- (i) change is constant, so new unknowns will continue to arise
- (ii) research will always uncover new unknowns
- (iii) some things are unknowable
- (iv) the techniques to research some unknowns are not available.

It is sobering to couple the unlimited nature of unknowns with the fact that the capacity to undertake research is a limited resource. In his book *Inquiry and Change*, Charles Lindblom (1990, p. 162) contended:

Professional inquiry is a scarce resource even in a wealthy U.S., never abundant enough to permit study of all important social phenomena and problems, even if the entire adult population became social scientists.

This holds not just for social scientists, but for researchers in general. Consequently, there can never be enough researchers to study all the important problems existing at any one time.

At present research effort is largely devoted to reducing unknowns, by producing new knowledge. Appreciating that unknowns are infinite helps raise awareness of the need to devote some of the finite research effort to other ways of managing unknowns. Smithson (1989) suggests that these include: acceptance, exploitation, relinquishment, denial and banishment, each of which can be adaptive or maladaptive depending on the circumstances (see also Smithson et al. 2008; Bammer and Smithson 2009). A primary aim of research on unknowns is to better equip decision-makers and other practitioners to deal with uncertainty when responding to complex problems. Knowledge (or evidence) alone is not enough. The remaining unknowns also have to be taken into account.

Responding to heightened awareness of what we do not know, as what we know increases

The argument that we need to put effort into ways of responding to unknowns other than reducing them is strengthened by heightened awareness of unknowns. A useful metaphor here is an island. Let the island represent knowledge in an infinite sea of unknowns. The shoreline is the awareness of what we do not know. As the island grows, the shoreline also expands. Hence we become more aware of unknowns, as well as appreciating the limitations of our capacity to reduce them through research.

Overcoming the fact that no discipline or other area of intellectual endeavour has the mandate to take an overarching view of unknowns

I have already described that each discipline and practice area covers only a fraction of the terrain in terms of the different kinds of unknowns contained in complex problems and that there is no neat correspondence between disciplines or practice areas and different kinds of unknowns, either in terms of what they concern themselves with or in terms of responses. What is more, it is no-one's business to take an overarching view of unknowns and to figure out how to make progress in dealing with them. No discipline or practice area has this mandate. As a consequence there is limited cross-fertilisation between different developments in responding to unknowns, which usually occur ad hoc in the context of research on complex real-world problems. I argue elsewhere (Bammer 2005, 2008) that a new discipline of Integration and Implementation Sciences (I2S) is required to take this overarching role.

Avoiding three problematic responses:

- a) overconfidence, b) nihilism and despair, and
- c) providing a hiding place for corruption and incompetence

Having a limited understanding of the importance of unknowns can lead to overconfidence. Steve Rayner (2006, p. 5) discusses this in relation to policy making on environmental risk:

...policy makers are consistently led to believe that, given time and money, scientific inquiry will reduce relevant uncertainty about environmental

risk. Their scientific advisors hold out the promise that more fine-grained information will clarify the nature and extent of the problem and enable policy makers to craft efficient and effective responses.

Rayner then goes on to point out why this is mistaken, based not only on the new areas research uncovers, but also the often conflicting findings of different investigations. Understanding the unlimited nature of unknowns is also relevant here.

On the other hand, once the extent and inevitability of unknowns is appreciated, tackling unknowns can be overwhelming and it can be tempting to reject research and action completely. Such nihilism is also inappropriate. Good research will provide new insights and, even though actions will always be imperfect, some actions are much better than others.

Third, the unscrupulous can ‘game’ the ubiquity of uncertainty to cover up incompetence and even corruption. For example, the impossibility of obtaining a full picture of a situation may be offered as an excuse for not taking sensible action. This must not be tolerated.

Agreeing on terminology

An overarching challenge to making progress on unknowns is that there is not yet an agreed terminology. Here I use unknowns and uncertainties interchangeably to designate the whole orbit of what is outside the world of knowledge. Others use the term ‘uncertainty’ to refer to a specific subset of unknowns, but these subsets are often different. For example, for Smithson (1989) uncertainty refers to partial information and can be subdivided into three categories—vagueness, probability (the domain of statistics) and ambiguity—whereas for Matthews (2009) uncertainty refers to unknowns which cannot be quantified, in contrast to risk which refers to the unknowns which can be quantified. Smithson also points out that other overarching terms, like ignorance, which he tends to prefer, often have pejorative connotations.

There is also no agreed terminology for different kinds of unknowns. For example, Smithson (1989) has developed a typology of unknowns in which he differentiates between error, irrelevance, distortion, incompleteness, untopicality, taboo, undecidability, confusion, inaccuracy, uncertainty, absence, vagueness, probability, ambiguity, fuzziness and non-specificity. The point here is not to discuss or analyse these distinctions (interested readers could see Smithson 1989 or Bammer et al. 2008), but to point out that terminology is complex and not yet agreed.

Conclusion

Responding to these challenges requires painstaking work. One task is to sort out issues of terminology. Another is to gather and categorise different ways of responding to unknowns, along with examples. Further, new ways of understanding and managing unknowns need to be developed. These insights also need to be disseminated and adopted in the research and practice worlds.

One way of moving forward is to focus on specific problems, as this book has done, and to start to expose researchers and practitioners to new ways of thinking about unknowns. It is important to bring in a broad range of perspectives and to present some real intellectual depth, not just a surface view. This requires the creation of an atmosphere where ideas outside individual comfort zones are neither dismissed nor accepted uncritically. Just because an area is hard, does not mean it is worthless. But neither does it mean it is not open to question. Such an exercise can only work when the researchers and practitioners are at the top of their game, as the authors in this book are. It guarantees that the exercise of engaging with difficult ideas is worth the effort.

The book has combined several approaches. One was to invite those familiar with the policing of serious crime to look at their own research or practice with a greater than usual focus on uncertainty. Another was to invite those familiar with unknowns to apply their thinking to the policing of serious crime. The third was to promote exchange between these perspectives, as well as with others interested in the topic (the conference audience).

The challenge now is to build on this initiative. One book and conference can only be a small step forward. We are planning further work to expand thinking about uncertainty, develop new responses to it and enhance the effective uptake of productive insights into the practice of policing. We invite your comments and feedback to Gabriele.Bammer@anu.edu.au.

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