



Emergency Planning College
Occasional Papers
New Series

Number
August 2016

15

Critical Thinking in Crisis Management

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Acknowledgement

The writer wishes to acknowledge Dr Robert Macfarlane for his useful feedback on the final draft of this paper and Helen Jubb for graphics and formatting.

Introduction

The purpose of this paper is to examine ways in which the discipline of critical thinking may help the crisis manager establish situational awareness and impose effective strategy, direction and action in situations that are exceptionally volatile and uncertain. In such circumstances, information available to decision-makers is likely to be ambiguous. Also, there may be too much of it or too little, and what there is may appear to be unstructured, confusing and possibly contradictory. The situation is likely to be uncertain and suitable courses of action may not be readily apparent, or clear enough to support confident and effective decision-making. However, this may be exactly when urgent choices and critical decisions have to be made.

Most experienced crisis managers will recognise these problems as characteristics of crises. They complicate the business of managing information in order to establish situational awareness. This awareness, when shared with the crisis leadership team and key stakeholders, is the essential basis for effective choices of strategy, direction and action. Shared situational awareness implies creating and maintaining a common understanding of what is going on, what that means (in terms of its implications) and what it might mean (in terms of reasonable deductions that can be made about future developments).

A range of tools to help managers do this is described in MacFarlane (2015) and MacFarlane and Leigh (2014). There is also an extensive and useful body of guidance from many sources around the use of tools such as standard operating procedures, decision-making models, aides-memoire and checklists. These have been produced as practical “handrails” (JESIP, 2013), advocated as a result of research into the effective management of extreme complexity (Gawande, 2010), analysed in the context of the human/technology interface (Langewiesche, 2010, Perrow, 1986) and considered in respect of human error (Reason, 1991).

Fundamentally, all of the above exist to help the crisis manager to impose a sense of order and purpose on chaos, make the right choices and begin to exert a degree of effective control over the response to the crisis. This requires:

- The creation, maintenance and progressive adaptation of effective and shared situational awareness;
- The selection and maintenance of an effective strategy that articulates the ends, ways and means by which the crisis will be resolved;
- Effective and timely decision-making around choices of direction and action.

Any mechanism, process or tool used by the crisis manager to achieve these things needs to be applied sensitively, using reflective, analytical and structured thought processes. The operative word, used above, is “handrail”. In other words, they are guides to – and not substitutes for – individual and collective thought and decision-

making. Their use does not remove the need for critical thinking at all stages of their application and in the evaluation of their outputs.

Critical thinking disciplines will help the crisis manager to:

- Create a more accurate and nuanced understanding of the situation;
- Moderate the impact of cognitive biases that predispose all of us to occasional errors of different types;
- Manage conflicting perspectives, especially in a multi-agency response;
- Retain a healthy sense of sceptical analysis, and;
- Use decision-support tools and allied processes to their best effect.

What is Critical Thinking?

Critical thinking has been systematically examined since the early years of the last century, starting with the work of Dewey (1910). The aim here is not to review that history, or to reflect on the relative merits of its many different definitions, but to distil the key elements into a short practical guide for emergency and crisis managers. Readers who wish to understand the evolution of the discipline and the thinking behind it are referred to Fisher (2001) and Novella (2012). Fisher's main focus is on the application of critical thinking to education, learning and research. Novella focuses on its use in daily and professional life. The basic characteristics of critical thinking described by both are consistent with each other and are paraphrased in the following summary.

It is an active form of reflection which is deliberate, persistent and careful. It challenges preconceptions, perceptions and received wisdom. And it is, most importantly of all, focused on deciding what to believe and what to do. It is, therefore, inherently practical and generates a set of guidelines for the practitioner. It involves what some have called metacognition, or the act of thinking about how we think.

The aim of critical thinking is to better understand the meaning and implications of information, conclusions, options and decisions and to identify and evaluate the assumptions upon which thinking (our own and others') is based. It can bring a powerful rigour to crisis management, if it is applied with perseverance, determination and self-awareness.

Fisher (2001) uses an academic perspective to describe the key features of critical thinking. They are summarised here as:

- Making a well-reasoned "case" for any decision or action;
- Identifying and evaluating assumptions underlying that case;
- Clarifying and interpreting ideas from all perspectives;
- Judging the validity of arguments and claims;
- Explaining by analysis and evaluation;
- Drawing inferences.

Novella (2012) provides a list of practical things to do to bring a critical thinking discipline to bear on a problem. These are:

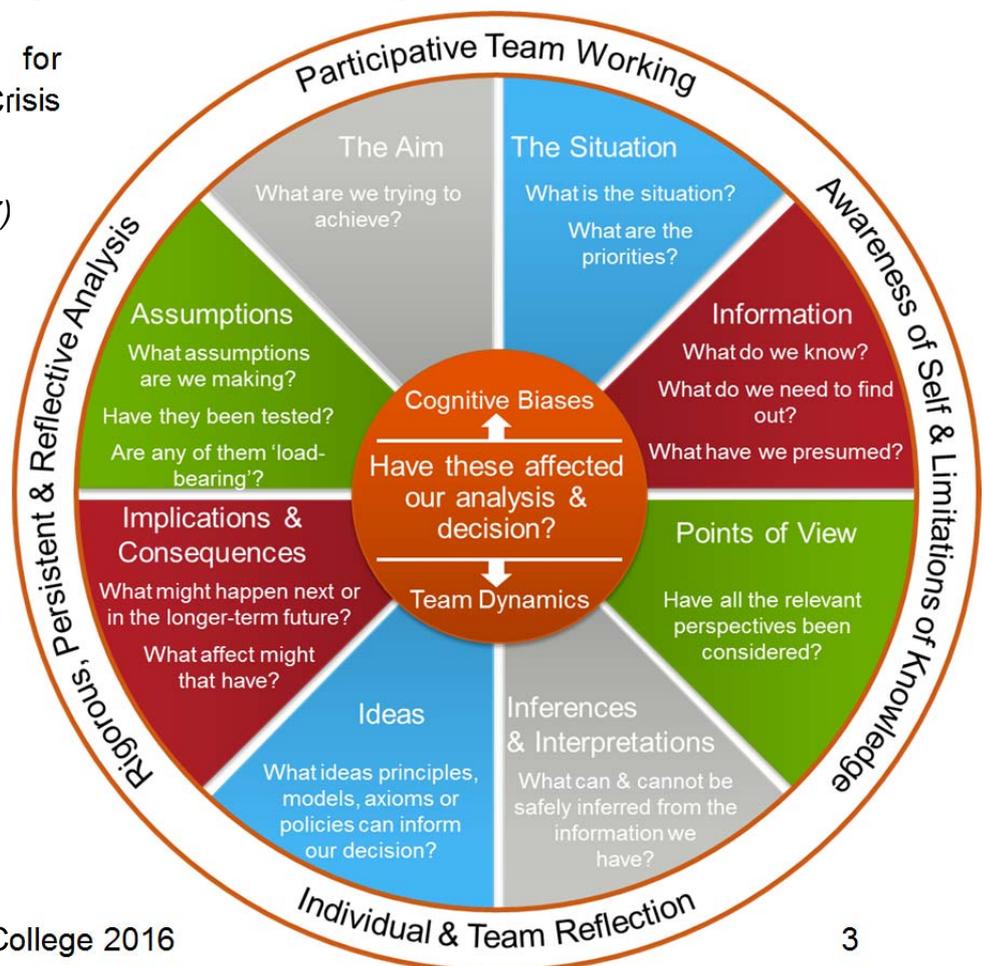
- Examine carefully everything about an issue that you think or assume to be true;
- Examine your logic for biases, flaws and untested assumptions;
- Be aware of your own motivations for believing in or preferring a particular explanation, interpretation or choice;
- Examine the implications of what you believe, and test those beliefs rigorously;
- Check with others, who may have a differently informed perspective – remembering that you do not know what you do not know;
- Check for complacency about your own level of knowledge;
- Accept that there will be uncertainties and limitations to your knowledge and understanding.

For Novella, who comes to it from a neuroscience background, critical thinking is a defence mechanism. It is a defence against errors in thought and action caused by our natural biases in perception, natural “default” tendencies in our thinking, limitations to our knowledge and, possibly, our false beliefs (2012).

Moore (2007) provides a useful model of the key elements of critical thinking, in an intelligence analysis context. This is presented below in a form adapted for crisis managers and teams. Note the implied requirements for rigour, perseverance and detailed reflection at all stages of the decision making process.

Figure 1: A Model for Critical Thinking in Crisis Management

After: Moore, DT (2007)



Cognitive Biases and Heuristics

There are many recognised types of cognitive bias and the crisis manager needs to understand them and their potential effects. In general terms they are defined by Roberto (2009: 102) as:

*“The decision-making traps that afflict all of us as we try to make choices. We fall into these traps because of cognitive limitations that are characteristic of **all** human beings”.* (Emphasis added).

The key point here is that we are all subject to them, all of the time. They affect our perception, sense-making and decision-making. They are closely related to heuristics. Heuristics are mental devices we have learned to use to speed up and economise our decision-making. They are generically defined by Novella as:

“A cognitive rule-of-thumb or mental shortcut that we subconsciously make, that may be true much of the time but is not logically valid”. (2012: 200)

In this sense “not logically valid” means not arrived at by means of logical reasoning in the critical thinking sense. It is not strictly the same thing as being “wrong”, but our heuristics and biases certainly can lead us to flawed decisions.

Crisis leaders need to be aware of the potential influence of heuristics and biases, understand their working and moderate their impact. Hess *et al* (2008) describe critical thinking as “...a process that unveils uncertainty” and which may mitigate decision biases. This suggests that the greater the level of uncertainty, the more we are prone to the influence of cognitive biases. This is a powerful reminder of the need for crisis managers to be accepting of a certain level of uncertainty (as “part of the job”), aware of its impact on their decision-making and cognisant of the value of critical thinking as a counterweight to it.

Biases and heuristics have a substantial literature and research base. Their importance for practitioners cannot be dismissed. For a quick reference, MacFarlane and Leigh (2014) provide a summary and brief description of the main ones that affect situational awareness and decision-making in crises, with a description of their main effects. For ease of reference, that summary is reproduced as an annex to this paper. A fuller treatment can be obtained from Kahneman, Slovic and Tversky (Eds) (1982).

The Link to Decision-Making

It was mentioned above that there is an early requirement for managers to impose a sense of order and purpose on the apparent chaos of a crisis. This is important for a number of reasons, including the demonstration of leadership, setting a personal example of decisiveness, authority and calmness and inspiring confidence in the team, stakeholders and the community.

A key question is what happens to our thought processes when we are facing situations that seem to be “out of our control”? Whitson and Galinsky (2008) provide a compelling insight into this issue. Their work led to two important conclusions:

- When decision-makers feel that a situation is “out of their control” it degrades their ability to recognise patterns and form in the situation facing them;
- It also leads people to over-simplify complex situations and problems. Associated with that is a form of stereotyping, which is the adoption of over-simplified rules to explain complexity when it challenges our ability to influence what is happening around us and to us.

What does this mean for crisis managers? First, pattern-recognition is fundamental to intuitive decision-making. According to Klein (1998), we try to understand situations by looking for things in them which match our past experiences. We use past experiences, and comparisons between them and the current situation, to create a feasible analogy – a way of understanding a situation in terms of its similarities (or differences) to a previous event.

This can generate a sense of what is instinctively the “right” thing to do in response to a problem – a “gut instinct”, in fact. Generally speaking, however, we are better at recognising similarities than differences when comparing situations to our experience (Neustadt and May, 1986). This can lead to flawed choices, but the main point is that this type of analogous reasoning and its associated intuitive decision-making rely on effective pattern-recognition.

Rosen *et al* (2008) confirm that the earliest decisions in a crisis tend to be “fast and frugal” intuition-based ones. There may not be enough time (or perhaps enough information) to support more deliberative and reflective approaches. A comparison of the characteristics of these two types, also known as “fast” and “slow” thinking (Kahneman, 2012) or “system 1” and “system 2” thinking, is in MacFarlane and Leigh (2014:16).

So, when decision-makers feel that a situation is “out of their control” they should be especially sensitive to what their intuition is telling them, because the pattern-recognition it relies on is likely to be temporarily degraded. This also means their sense of situational awareness could be degraded, just when the very important, early (“fast and frugal”) decisions in a crisis have to be made.

Secondly, over-simplification of situations, problems and the rules by which we understand them also militates against effective situational awareness, which places a premium on the ability recognise and understand the nuances in complex situations. The overall lesson from critical thinking is to be mindful at all times of the personal and situational factors that are potentially influencing one’s understanding, awareness and decisions. The recommendation for crisis leaders is to be aware of these potential effects, recognise their possible impacts and self-consciously try to mitigate them in themselves and others.

If the wrong interpretations are made in the creation of situational awareness, it stands to reason that subsequent choices about strategy and decision-making may be flawed. But it is important to remember that there is nothing intrinsically wrong with intuitive decision-making. It is natural, inevitable and it can be highly effective, especially when selectively combined with more deliberative approaches. As Gigerenzer and Todd (2004) point out, the heuristics we use to make fast and intuitive decisions are an “adaptive toolbox” which can “make us smart”.

But heuristics are also a trade-off. They help us work in a “fast and frugal” way, making rapid intuitive decisions. But in using them we trade for speed and efficiency and against the chance that we will miss the nuances that make a particular case very different. In other words, intuition is fallible and we must understand when we use it that we are running a risk that more deliberative approaches could mitigate to some extent.

Klein’s (1998, 1993) work suggests that the chances of getting intuitive decisions right are much improved by good situational awareness, which in turn depends at least in part on effective pattern recognition; it’s the way we organise, make sense of and use, our experience. So, memory and recall are fundamental to recognition-primed analysis. It is, therefore, worth considering them from a critical thinking perspective. We tend to assume that our memories are mostly accurate, most of the time. There is also something existential about them; we assume they are “true” because we experienced them and can recall them. Not surprisingly, a critical thinking perspective challenges such presuppositions.

First, we have to remember that memories are not an objective record of events. Memories are, in fact, “constructs”. That is to say we organise them and make them. This is a sub-conscious process, but it means that memories are not simply absorbed without being edited. They are also highly prone to inadvertent “contamination” when we share experiences and “compare notes” with others. So, an early opportunity for this inadvertent contamination after a crisis or an exercise is at the collective “hot” debriefing stage when, without much time for reflection views, feelings and conclusions are discussed in open forum.

Furthermore, by the time of the “cold” debriefing, probably some weeks later after much reflection, conversation and comparison, experiences have probably been significantly re-interpreted. They will then continue to be “updated” each time they are re-visited. This is not to suggest that they are intrinsically false or deliberately falsified – far from it. They have “merely” gone through, and been mediated by, cognitive and social processes that have influenced their shape and perceived meaning (Novella, 2012).

Also, the degree of confidence a person has in the accuracy of a memory is no safe indicator of its true, factual accuracy. For example, a study by Talarico and Rubin (2012) found that the accuracy of, and people’s confidence in, memories degrade more or less equally over time. However, things seem to be a little different when it comes to what they called “flashbulb” memories. These are memories of highly

salient, vivid and dramatic events. In these cases, whilst accuracy and consistency in subjects' memories showed the predictable decline, their confidence in those memories nevertheless remained high.

In other words, they found that if the event was highly salient people could still vividly and confidently recall what had gradually become inaccurate – or at least adapted - memories. This effect is compounded by people's natural and understandable tendency to regard experiences of past incidents and near-misses as more "authentic" than the lessons they derive from simulations, exercises and modelling (Bonner, 2010:247).

Since crises are likely to be "flashbulb" moments in a person's life, this has obvious implications for their long-term memory of them, and therefore for what they come to regard as the learning and experience they draw from them. That, in turn, has implications for when they use that experience and learning to create situational awareness, to reason by analogy and to make decisions.

Analogies and Assumptions

As we have seen, analogous reasoning is fundamental to naturalistic or intuitive decision-making – and this includes recognition-primed decision-making. The implication here is that crisis leaders need to exercise a certain judicious scepticism about analogies drawn from comparison with experience and previous events, when these are being used to inform situational awareness and decision-making. The assumption of validity in the analogies that we make should be checked rigorously.

The problem is how to be sure that our analogies are an accurate "fit" for the current situation we are trying to understand. In other words, how do we bring rigour and critical thinking to our intuitions and mitigate the impact of flawed memory, heuristics and cognitive biases? Neustadt and May (1986) suggest the following approach:

- List (in writing) not only the similarities in a situation that are considered analogous to your experience, but also the differences;
- List what is known, unknown and presumed about the situation;
- Share this appreciation with others and invite them to challenge it.

Uncertainty is the issue here. Hess *et al* (2008) make a useful link between uncertainty and this sort of analysis, by pointing out that critical thinking in teams:

"...manages uncertainty by revealing it, identifying its sources and devising ways to test its depths or diminish it".

In other words, teams can be better than individuals at probing the limits of our understanding and identifying where the gaps in knowledge and awareness are.

The "known-unknown-presumed" analysis (also called KUP analysis) referred to above is explained in more detail by MacFarlane (2015:11). It includes the

identification and testing of assumptions, especially at the “presumed” stage. MacFarlane defines an assumption as:

“...something that is held to be the case or true, without evidence that confirms it to be so. As risk and crisis management is inherently an exercise in the management of uncertainty, assumptions of various types are necessary.”
(Emphasis added)

However, it is well known that they can also be wrong. We can become destructively attached to them even in the face of contrary evidence and we tend not to challenge them too forensically – most of the time. There is a real possibility that decisions based on flawed assumptions can lead to failure. So, the same question needs to be asked; if we can’t avoid relying to some extent on assumptions, how can we bring rigour and critical thinking to our use of them?

MacFarlane (2015) provides a useful checklist of methods and tools with which to do this, drawing on Dewar (2002). In summary, it is recommended that crisis managers should:

- Identify all the assumptions underpinning your analysis and choices;
- Record and share them;
- Categorise them in terms of their “load-bearing” significance;
- Test them where possible;
- Challenge them (and explore their implications) by making contrary assumptions (the inverse or opposite of what you are assuming).

There are two more justifications for doing this that are worth noting. First, as Novella points out (2012: 183), people who are of above-average intelligence are not necessarily better decision-makers for it, but they do tend to be better at rationalising their choices and defending them. So, flawed decisions may be made to appear highly plausible – at least until they are exposed to critical analysis.

Also, we need to be aware of the “Dunning-Kruger Effect”. Kruger and Dunning (1999) found that less competent individuals tend to be less aware of the limitations of their competence, and often demonstrate false confidence in their choices as a result. It is an attribute of reflective and critical thinkers that they are aware of the limitations of their knowledge and their competence – and make compensating adjustments in their decision-making styles and leadership behaviours.

Both of these lines of argument support the need to bring as much rigour as possible into crisis decision-making – especially of the “fast and frugal” type. It will be clear by now that doing this has another very significant outcome for crisis managers. It will, if done collectively and placed on record, make decisions based on intuition easier to promote, easier to gain acceptance of in a multi-agency group and more robust in the face of scrutiny.

Indeed, it is argued that if the above tools and techniques were applied carefully, the outcome could be intuitive decisions that are at least as defensible and rigorous as

those arrived at by using deliberative models and processes. This is, potentially, a solid advantage derived from the application of critical-thinking approaches.

The assumption that decisions made by deliberative processes, like the use of models such as the UK emergency services' Joint Decision Model (JDM) (JESIP, 2013) are, by their very nature, more "rational" is amenable to critical thinking. There is no doubt that such models are compelling in the reassurance they can give, especially to individuals and teams facing critical decisions with imperfect knowledge and information. The JDM, in particular, is arrestingly flexible. It can (at least in the hands of a trained practitioner) be applied across the full range - from the immediate front-line decision made in seconds, to the evaluations of a crisis management team making decisions with wider and longer-term implications. But their outputs can be subject to the biases and cognitive errors of the people who apply them and provide the inputs. This is despite the "illusion of control" they may engender.

A risk in the application of deliberative decision models is "garbage in, garbage out". Furthermore, Sadler-Smith and Sparrow (2008) point out that deliberative decision-making is more difficult, and tends to be less successful, in teams that have not yet settled on a common understanding of their goals and the dynamics of the situation facing them. In other words, the application of a prescribed process will not necessarily overcome deficiencies at the individual and team levels of input.

Also, they need effective and shared situational awareness to work properly. The quality of the decision depends absolutely on the quality of the choices and interventions made at each stage of the deliberative model process. There are opportunities for critical thinking which confer significant benefits at each stage of the application of a model like the JDM, but especially in the assessment of information, the choice of a strategy and the identification and selection of options.

Expert Teams and Leadership

Crisis management teams are usually "teams of experts" – because members are there to provide a specific technical or professional expertise. An "expert team" is something slightly different – the name suggests a group of people who have a practiced expertise, not only in their own disciplines but also in working together on shared problems.

Team-working is fundamental to effective crisis management. As Hess, Freeman and Coover (2008) point out:

"No individual has enough knowledge or cognitive capacity to fully address complex mission problems ... a team effort is necessary to ensure that key information is gathered and considered, assumptions are revealed and tested and plausible interpretations and plans are considered."

But what is an expert team? Rosen *et al* (2008:220) describes it as:

“A set of interdependent team members, each of whom possesses unique and expert knowledge, skills and experience related to task performance and who adapt, co-ordinate and co-operate as a team, thereby producing sustainable, and repeatable functioning at superior or at least near-optimal levels of performance”

To distil this definition out into a list of characteristics, they are teams which display:

- A commitment to shared situational awareness;
- Clearly defined roles and responsibilities;
- Shared vision and values;
- A commitment to learning from what they are doing;
- Trust in each other's competence and intentions;
- A continuous critical review of their strategies;
- The ability to co-operate well and co-ordinate their actions to specific goals;
- The ability to be flexible and adapt quickly when the goals have to change.

But crises are, thankfully, quite rare, so in a corporate setting, teams and leaders are unlikely to have to manage crises regularly enough to practice and refine these expert team behaviours. This is generally also true of UK civil emergency co-ordinating groups, because of the relative infrequency of such events and the turnover of staff. A developed discussion of the barriers to effective collaboration in crisis teams is provided by Pollock and Coles (2015). Also, such crises do not tend to last very long. There may not be enough time for newly convened teams to undergo a “learning curve”.

A programme of training and exercises, and rigour in the learning of lessons, can compensate for these factors to some extent. But the fact remains; team that may be relatively unused to working with each other may be convened to manage a crisis – and will have to learn quickly how to work with each other effectively. Leadership is critical here. Leaders need to be especially mindful of the “argument from authority”. Since they will usually be very senior leaders, with considerable personal and vested authority, their views, feeling and choices acquire extra force, salience and power. This might be desirable and useful in certain situations, but probably less so in the context of collaborative expert teams which rely on critical thinking.

Rosen *et al* (2008) list the key behaviours of expert team leaders as:

- Seeking ideas and options from the team;
- Explaining in detail the reasons for their choice of options and dismissal of others;
- Constantly reinforcing effective teamwork;
- Being receptive to feedback on their performance;
- Being oriented to behaviours and solutions – not personalities;
- Celebrating success and keeping the whole team informed at all times.

Expert team leadership therefore needs to be collaborative and participative, rather than derived from authority. Indeed, it is suggested that without a participative leadership approach the rapid development of expert team behaviours may be less likely to happen.

A key idea in this context is “groupthink”. The phrase was coined by Janis (1982, 1972). He described it as:

“...a mode of thinking that people engage in when they are deeply involved in a cohesive in-group, when the members’ strivings for unanimity override their motivation to realistically appraise alternative courses of action”

Furthermore, it represents:

“...a deterioration of mental efficiency, reality testing and moral judgement that results from in-group pressures” (Janis, 1982: 9)

Therefore, one dimension of this phenomenon is the collapse of critical thinking in teams. But it is also important to note that this is a feature of cohesive teams, not dysfunctional ones. It tends to happen when team members share a strong commitment to achieving consensus and agreement. There is a clear message here for crisis management teams, and especially for their leaders; beware when a team ‘rushes to judgement’ and makes easy, decisive conclusions about a problem.

The groupthink phenomenon has another interesting dimension, explored by Myers and Lamm (1977). Their studies suggest that teams prone to groupthink also tend to cohere around whichever point of view is initially dominant in the group. This is very significant. The lesson for crisis managers is to be aware of the tendency to groupthink, and especially aware of the need to challenge any conclusions that seem to reflect an early, possibly premature, consensus.

In summary, the single most important thing a crisis leader and his/her team can do, to facilitate the application of critical thinking and foster expert team behaviours even in relatively untested teams, is to focus on the process of deciding – rather than the decision itself (Novella, 2012). Metacognition (thinking about how we think) has already been mentioned, and this recommendation extends it to include the related need to decide how to decide.

This is not as radical a suggestion as it sounds. It is certainly not an invitation to delay, extend the process of deciding or delve into abstract philosophy. But it is an invitation to reflect on how a decision is being made as well as what that decision should be. This frees up space and energy for a critical analysis of the meaning and significance of information. It will also:

- Support the management of divergent (analysis-oriented) and convergent (solution-oriented) thinking processes. Both of these are needed in a crisis management team;

- Help to refine the choices of strategy and action that are available and their relative merits and constraints;
- Mitigate the impact of cognitive biases and heuristics and introduce new levels of healthy, forensic and multi-vocal scepticism;
- Engage team members in a positive and egalitarian way.

This can only benefit leadership and team performance in crisis management and facilitate more effectively the resolution of crises.

Summary of Recommendations

In summary, this paper recommends that crisis managers and leaders:

- Understand that interpretations and choices can be effected by innate biases. If under pressure to react to a complex situation quickly, the leader is already at exaggerated risk of impaired intuition and flawed situational awareness;
- Be active and alert for the impact of stereotyping, biases and heuristics on your interpretations, deductions and decisions – and those of others. They are not necessarily a bad thing and can support effective decision-making. But their impact needs to be understood and their influence taken into account;
- Remember that memories, pattern-recognition and experience are all affected by biases and are, to one extent or another, constructs – not necessarily entirely true or completely accurate.
- Be constructively sceptical, but not dismissive, of lessons transferred from previous and analogous circumstances;
- Use the tools and approaches discussed in this paper to bring increased rigour (and defensibility) to decision-making;
- Expose, share and evaluate all the assumptions underpinning a decision or strategy;
- Learn from the characteristics of expert teams and their leaders, recognising that critical thinking disciplines and behaviours are less likely to flourish or gain complete acceptance under non-participative or weakly collaborative leadership.

Conclusion

These recommendations should help bring rigour and critical thinking to the processes of crisis management, and support good outcomes. In particular, shifting the focus of the team's activity from the decisions themselves to the processes by which they were made is fundamental. This is in keeping with the general ethos of multi-agency and consensus-based leadership, which is the way in which UK emergency management co-ordinating groups are expected to work (see Cabinet Office, 2012a &b). Specifically, it will support critical thinking by creating and then

widening a multi-vocal dialogue and an inclusive and reflective decision-making approach.

This will, of course, have to be done with due regard for the occasional pressure of time and the paucity, or occasionally excess, of information. But as a general discipline it should help to ensure that all the expert narratives in the team are engaged with, used to best effect and allowed to inform the choices that are made. If it all comes down to good shared situational awareness, and it usually does, then remember that this is not something that can be imposed on a team. They have to be fully involved in its creation and development, and empowered to be critically and constructively sceptical.

The results should be better-informed shared situational awareness, a more robust basis for choices of strategy and better decisions around what to do and how to do it.

Annex: Excerpt from:

MacFarlane, R and Leigh, M. (2014) *Information Management and Shared Situational Awareness* Emergency Planning College Occasional Paper Number 12. Easingwold: EPC

Appendix B: Summary Of Perceptual And Cognitive Biases (developed from Baron, 2008; Evans, 2007; Newell et al., 2007; U.S.Government, 2009)

Perceptual and Attentional Biases	
Bias	Comments
Anchoring	This is the tendency, when estimating a numerical value, to start from a certain value (the anchor) and then adjust away from that figure. This is a 'contamination effect' which results in values that are biased towards the anchor value. A key point is that the anchor value may be quite arbitrary and quite meaningless, yet it has been proven to distort estimates.
Representativeness	This is observed when people make judgments about the likelihood of an event, situation or circumstances on the basis of the degree to which it is regarded as being representative of a particular class. If we strongly associate specific cases with a particular class we will tend to overlook complicating or disconfirming factors such as small sample size.
Vividness	If something is vivid it is easy to recall and hard to ignore and it will influence estimations of likelihood and impact. For example if graphic images of past events are readily recalled people will tend to overestimate the prior probability of those events.
Primacy/Recency effect	When presented with a list, individuals have a general tendency to recall those entries at either end of the list more easily than those in the middle. The primacy (ease of recall of the start) and recency (ease of recall of the end of the list) effects operate in conjunction so that recall of entries or events starts high, dips dramatically and then climbs again towards the end. They are forms of the Availability Bias – whereby we tend to place excessive reliance on information that is available to us or is recent – and therefore salient in both cases.
Biases in Evaluating Evidence	
Bias	Comments
Assumptions	Assumptions exist at a variety of levels and Mitroff (2004) uses the analogy of Russian Dolls to describe the way in which they can be nested. Critically, people tend to be reluctant to abandon assumptions, even in the face of substantial evidence that they are no longer reliable, and experts can be more attached to assumptions than non-experts.
Sample size fallacy	This describes the failure to consider the size of a sample in making inferences about, or based upon, the characteristics of that sample group. Small samples may not be representative of the population as a whole, but there is a tendency to assume a greater degree of representativeness than is warranted.

Overweighting of small probabilities	Small probabilities, especially if associated with vivid events, will tend to have a disproportionate amount of significance in decision-making. Correspondingly people will tend to underweight much more high probability events.
Missing data	The term 'the absence of evidence is not evidence of absence' gained some notoriety in respect of WMD, but has wider significance, for example in risk assessment or clinical diagnosis. Mitroff (2004) describes research into aircraft armouring during the Second World War: once engineers realised that the pattern of bullet holes on <i>returning</i> aircraft was no predictor of where armour should be placed, survival rates increased.
Hindsight bias	This is the tendency to regard past events as more predictable than they might reasonably have been at the time. Chains of events in complex systems may be apparent with hindsight, but be hard to identify, and differentiate from other possible outcomes, when assessing risk.
Biases in Probability Estimates	
Bias	Comments
Availability	Ease of recall influences probability estimations: when examples readily come to mind then probabilities tend to be overestimated. Conversely, when few or no examples can be recalled then prior probabilities tend to be overestimated.
Conjunction	This is judging probability of a subordinate category ($P(A\&B)$) greater than a superordinate category ($P(A)$). This may be related to the existence of cognitive prototypes, a sub-set of which (in popular terms) will be stereotypes.
Base rate neglect	This describes reasoning errors arising where the baseline incidence or prior probability of an event is not adequately considered in making judgments about future likelihood.
Gamblers' fallacy	This is the tendency to overestimate future probabilities on the basis of the distribution of past events. If a flipped coin has fallen heads up 6 times in a row, the likelihood of the next result remains 50/50, but a false belief that it is more likely to be tails is widespread.
Biases in Perceiving Causality	
Bias	Comments
Pattern illusion	This is the tendency to perceive patterns such as clusters in actually random distributions.
Attribution	Individuals tend to ascribe greater significance to their decision-making and input into events than they do for others who were involved. Conversely, contextual factors tend to be ascribed greater significance to explain outcomes when others were involved.
Rational intent	People tend to attribute rational intent to the cause of events that may in fact be accidental, unintended or even random.

Motivated Biases and Wishful Thinking	
Bias	Comments
Sunk cost bias	A sunk cost is one that cannot be recovered and people tend to give undue recognition to sunk costs when considering the future efficiency and effectiveness of a particular course of action. Decision makers show a strong inclination to stick with a course of action, or perhaps escalate their commitment, even when positive long-term outcomes look unlikely.
Wishful thinking	People prefer attractive explanations and projections of outcomes to unattractive and dissonant ones, and once assumed these can achieve the status of fact rather than speculation.
Overconfidence	This describes the misplaced confidence that people have in their own abilities and judgments.
Confirmation bias	This describes a tendency for individuals or groups to search for information that supports an adopted or preferred position or interpretation of events and avoiding falsifying evidence. Additionally this bias describes the tendency to interpret information in a way that supports or confirms a desired position or preferred interpretation, thereby reducing cognitive dissonance.
Diagnosis bias	Once a conclusion such as a medical diagnosis has been reached, evidence or contrary arguments that are dissonant with that conclusion may tend to be underrated or disregarded.
Belief bias	The tendency to judge evidence or an argument on the basis of its fit with belief structures; dissonant evidence is likely to be rejected on the basis of belief rather than comprehensive analysis and reappraisal.
Congruence bias	This describes the tendency for individuals to directly test, rather than indirectly test, suppositions and more formal hypotheses relating to a problem to be solved or situation to be interpreted.
Future discounting	People will tend to regard short-term gains as preferable to even significantly larger gains at some point in the future. Significant future risks are also discounted; they are judged as disproportionately less significant than risks that may manifest in the short term.
Psychophysical Distortions	
Bias	Comments
Cognitive narrowing	This describes the behaviour of individuals in focusing on elements of a situation rather than the situation as a whole, and the level of narrowing may be progressive as a response to mounting levels of stress.
Framing	Framing is a form of description dependency in which the way in which information is presented, where the manner of presentation can influence its interpretation e.g. 5% fat vs 95% fat free.
Affect	This describes that way in which a person's emotional response to circumstances or information can influence decisions made about it. For example, a positive feeling (affect) about a situation has been shown to lead to a lower perception of risk and a higher perception of benefit.

Summary: What can crisis managers do about these biases?

The key point to understand is that they are natural and innate. They probably cannot be entirely suppressed and it is probably best not to try. However, knowing about them and understanding how they work can help decision-makers moderate their impact and question their thought processes. In general:

- Be aware of them and their potential influence.
- Make others aware of them in the team.
- Be reflexive, and critically review past actions and decisions to identify their influence.
- Get rapid and honest feedback on your choices.
- Use “neutrals” to test your choices (people with a different profile of biases).
- Encourage candour and openness in discussions, allowing all to speak and be listened to.
- Recognise that you can mitigate these biases, but not avoid them.

Leaders should, in particular:

- Be careful not to impose their “frame” on the group, especially when it reflects a single agency’s or team’s perspective or concerns.
- Hold back to avoid this and allow the team to work on solutions before intervening.
- Try to define problems in a variety of ways or from a variety of viewpoints, so that no one “frame” dominates through association with the leader.
- Surface, test and examine all assumptions made by all members and teams.

Be aware of the anecdotal tendency of groups to have a collective threshold of acceptability in risk that is higher than would be the case with individuals.

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