Use of Worst Case Scenarios in Bushfire Decision Making

Claire Johnson

Bushfire CRC PhD Scholarship Holder, School of Psychological Science, La Trobe University, Victoria

Prof. Geoff Cumming, Dr. Mary Omodei

School of Psychological Science, La Trobe University, Victoria

"When we fail to imagine the worst that could happen we do so at our intellectual peril. When our officials disregard the value of worst–case thinking they do so at the risk of much greater consequence" (Clarke, 2005).

Fire fighters are familiar with worst cases and know that minimising them is likely to increase safety.
Thinking about worst cases is an exercise in imagination: You need to imagine possibilities, as well as estimate probabilities.
Worst cases may be overlooked because they seem so unlikely, but this can lead to serious mistakes and disastrous outcomes (Clarke, 2005).
In the bushfire fighting domain, worst cases may involve death, serious injury or substantial loss of assets.

Theoretical Context
Naturalistic Decision Making (Zsambok & Klein, 1997) is the study of experts in realistic settings, with danger, time pressure and uncertainty.
Experts rarely make decisions by considering a range of options; often they intuitively just know what to do.
The Recognition Primed Decision model (RPD; Klein, 1998) attempts to explain intuitive decision making, suggesting that experts often recognise prototype situations.
This recognition produces cues, expectancies and goals, and suggests a possible course of action, which can be tested by mental simulation, before implementation.
Therefore, experts can quickly determine an appropriate course of action as the first option considered.
Worst case thinking may be important in all steps of the RPD model.
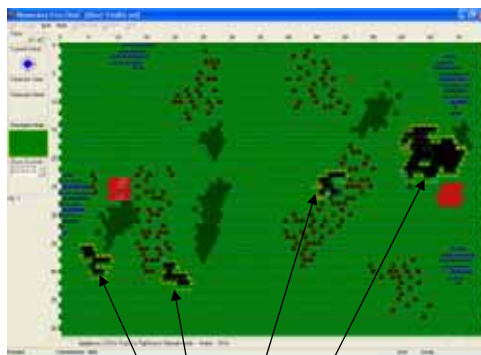
Previous Research 2005
Research funded by Bushfire CRC Project Support

Study 1 – *Post Incident Interviews*
Analysis of 31 interviews conducted in the 2004-5 fire season in Australia using the Human Factors Interview Protocol (HFIP; Omodei, McLennan, & Reynolds, 2005) identified an average of three mentions of worst cases per interview. A wide variety of worst cases were recorded.

Study 2 – *Experiments with Computer Simulated Fires*
A computer simulation program, Networked Fire Chief (NFC; Omodei, Taranto, & Wearing, 1999) was used to more thoroughly investigate the impact of reporting worst case scenarios.
Simply articulating a worst case seemed to have an effect on subsequent firefighting behaviour.

Simulated fires in Networked Fire Chief: What is the Worst Case in this situation?

Current Research
This research attempts to address these questions:
- How and when are worst cases used in decision making by expert fire fighters?
- Where are worst cases acquired (e.g., past experience, training, colleagues' stories)?
- Can consideration of worst cases improve procedures and training to achieve greater safety in decision making?
- Does adapting training to include more worst cases, in conjunction with most likely cases, improve the initial recognition stage of intuitive decision making?

Methodologies
- Post Incident Interviews, both routine and non-routine incidents
- Analysis of Official Incident and Accident Reports
- Cold Case Interviews, targeting past worst case incidents
- Analysis of Training Methods & Manuals, to understand current use of worst cases
- Experimental Simulation Studies, to test specific training hypotheses

Outcomes
We expect such research will have training outcomes and inform the content of operations manuals in order to enhance the use of worst cases in incident decision making so as to minimise the risk of disasters.

References
Clarke, L. (2005). Worst-case thinking: An idea whose time has come. *Natural Hazards Observer, 29(3), 1-3.*
Klein, G. (1998). *Sources of power: How people make decisions.* Cambridge, MA: MIT Press
Omodei, M., McLennan, J., & Reynolds, C. (2005). *Understanding the reasons even good firefighters make unsafe decisions: A human factors interview protocol.* Bushfire CRC Safety in Decision Making and Behaviour Project (D2.3), Report Number 1. Melbourne, Australia: La Trobe University, School of Psychological Science.
Omodei, M., Taranto, P., & Wearing, A. (1999). *Networked Fire Chief* [Computer Program]. LaTrobe University.
Zsambok, C., & Klein, G. (Eds.). (1997). Naturalistic decision making. Mahwah, NJ: Laurence Erlbaum.

LA TROBE UNIVERSITY