

Portal experiences: the impact of fire fighters' experiences of threat on risk perception and attitudes to personal safety

Holgate and Clancy examine the impact of threat experiences on the risk perception and attitudes to safety of volunteer fire fighters.

Abstract

Portal experiences are said to be those potentially life threatening experiences that enhance emergency workers' appreciation of risk and transform their attitudes to safety. This research examines the frequency and impact of threat experiences on the risk perception and attitudes to safety of volunteer fire fighters. Results show that life threatening experiences are common among volunteer fire fighters with over half the sample reporting such incidents. Those fire fighters who had had a threat experience reported a significant change in their approach to safety on the fire ground and identified significantly more risks in response to fire ground scenarios and were significantly more likely to identify human error and instability in a situation as risks, than those who had not had a risk experience. Results support the notion that portal experiences do enhance fire fighters perception of risk. It is suggested that the mechanism for this change is via an "affect heuristic" rather than rational cognitive analysis. It is recommended that fire agencies improve their incident reporting systems in order to gain training advantage from fire fighters' portal experiences.

The notion that fire fighters may have a life changing "portal experience" at some time during their career and that this is related to safer practice on the fire ground has gained currency among U.S. fire services (Mutch, 2005). Chamberlin (2005) describes the portal experience thus:

"Career fire fighters usually pass through a 'Portal' of sorts, a Safety Awareness Portal, achieving new perspectives, their reality altered. Transiting the Portal can be painful, maybe physically, always emotionally. They are often related to traumatic events such as South Canyon, Mann Gulch, Thirty Mile, Cramer, or a less legendary incident; perhaps a near miss, or a personal Waterloo. It may have happened to us, or involve a co-worker, or we have strong empathy for a situation we read about. Some think there is no significant emotional growth without a link to a traumatic experience." (p.1)

Chamberlin refers to examples of incidents in the U.S. where multiple fire fighter fatalities have occurred, e.g. the South Canyon fire where 13 fire fighters died (McLean, 1999), the Thirty Mile fire where 4 fire fighters were killed (United States Department of Agriculture Forest Service, 2001) and the Cramer fire where 2 fire fighters died (United States Department of Agriculture Forest Service, 2003). Corresponding Australian examples would include the Linton burn over (near Ballarat, Victoria) in which five CFA volunteers perished (Johnstone, 2002), and the Kuring-gai National Park burn in which 4 fire fighters died (Stevenson, 2001).

Previous research and theory (Gold, 1993; Slovic, Finucane, Peters & MacGregor, 2004; Slovic & Peters, 2006; Gold, 2007) suggests that risks are more keenly perceived when they engage the affective system (gut feel) than the more rational cognitive system. In the South Canyon fire, fire fighters decided to pursue the fire fight despite the fact that they had explicitly identified that they had broken 13 of 18 watchout situations (McLean). Although these fire fighters had

cognitively identified that they were at risk their affective systems were apparently not engaged and they felt little fear in the situation, to such an extent that some of these fire fighters were taking photographs of the fire minutes before they were over run (McLean).

Dual-process theories of thinking hold that affective and cognitive systems operate independently and research (Slovic & Peters, 2006) suggests that affective systems exercise a greater influence on our perceptions of risk and our tendency towards “unrealistic optimism” (Gold, 2007) than do cognitive systems. Gold (1993), for example, distinguishes between “hot” cognitions (those thoughts based on affect, intuition or gut feel) and “cold” cognitions (those thoughts based on rational analysis). Gold’s research shows that hot cognitions are the primary determinant of a decision to engage in risk taking behaviour. Slovic & Peters (2006) refer to this phenomenon as “the affect heuristic”. The implications of these research findings are that people are less likely to respond to risks that are perceived on the basis of rational cognitive analysis and more likely to respond to risks that evoke an affective response. It is likely that the portal experiences that Chamberlin (2007) refers to have such an impact precisely because these experiences evoke a powerful affective response in the fire fighters who have experienced them.

The deaths in 1998 of five CFA volunteer fire fighters in a tanker burn over at Linton, noted previously, was a kind of organisational portal experience for fire and land management agencies. In response to recommendations by the Coroner following the inquest into the Linton tragedy (Johnstone, 2002) the Victorian Country Fire Authority (CFA) instituted a “Safety First” campaign and required all volunteer fire fighters to complete a Minimum Skills training package before being eligible to be deployed to the fire-ground. Previous research (Clancy & Holgate, 2005; Sadler, Holgate & Clancy, 2007; Holgate & Clancy, 2007) has established that fire fighter risk perception varies considerably depending on individual differences in experience, education and the way in which a fire is framed (e.g. as either “going” or “contained”). The question remains however as to what impact portal experiences may have on risk perception and attitudes to safety on the fire ground. Fire fighting agencies necessarily grapple with the question of how can fire fighters’ appreciation of the threat of fire line operations be transformed from an intellectual knowledge (cold cognition) into a gut feel for danger which may better translate to safer decision making on the fire line. An aim of this research was to gather data on the frequency of threat experiences or near-misses among Australian fire fighters and to determine whether these experiences were related to risk perception and attitudes towards safety.

Method

Participants

Participants were 110 volunteer fire fighters (105 male and 5 female) ranging in age from 18 to 77 years ($M=38.75$, $SD = 14.25$). Participants varied in the number of years they had been a CFA volunteer, varying from less than one year (12%), one to two years (7%), two to five years (26%), six to ten years (24%), ten to twenty years (14%) and more than 21 years (17%). Participants were sampled from 5 of the 20 CFA regions throughout Victoria with members of 11 fire brigades represented. The majority of the sample (44%) had 1-5 years experience as a firefighter, 37% had 5-20 years experience and 19% had more than 21 years experience.

Materials

Participants were shown five photographs, which depicted a variety of fire ground scenarios (a motor vehicle accident; a house fire; a hazardous chemical spill, a grassfire and a bushfire). They also responded in writing to a questionnaire which, apart from the usual demographic information, asked: “Have you ever had an experience on the fire ground that caused you to behave more cautiously than before? (tick yes/no). If so, please give brief details.” Participants were also asked to respond in writing to the question: “Has the increased emphasis on safety issues within the CFA changed the way that you approach fires/incidents? (tick yes/no). If so, please give details.”

Procedure

Data were gathered as part of a larger study. Ethics approval for the research was granted by the University of Newcastle. Participants were asked to attend data-gathering nights at their local station held independently of other training or activities, which the brigade might hold. Data-gathering was administered by the first author. Participants were seated and each fire ground scenario photograph was projected onto a screen. Participants were asked to write down as many hazards/risks that they could see or anticipate in the scenario. Risks identified in response to the five fire ground scenarios were content analysed independently by the authors and five risk categories were identified: potential fire/explosion; potential for human error; failure to follow safe procedure; environment hazards and instability of the situation. Two separate scores for risk perception were calculated for each participant: 1. the total number of risks/hazards identified across all five fire ground scenarios; and 2. the total number of times each risk category was mentioned across all five fire ground scenarios.

Independent samples t-tests were calculated to compare mean total scores between groups of number of risks identified across scenarios and number of categories identified across scenarios. Qualitative responses were content analysed and categorised by the authors. Inter-rater reliability was 100%.

Results

Experience of risk

In response to the question as to whether they had had an experience on the fire ground that caused them to behave more cautiously 54% (n=60) said yes and 46% (n=50) said no. Figure 1 shows the categories of risk incidents that the sample had experienced.

In the wildfire category participants reported such experiences as unexpected wind changes; unexpected changes or flare-ups in wildfire behaviour; being burnt over or entrapped and falling tree limbs/rocks. One participant (male, 50, 10-20 years experience) had the following experience: "Got off appliance to open gate. Wind whipped up flame in long grass. Crew panicked and told driver GO, GO, GO and left me at gate on foot in long grass". Another (male, 48, 2-5 years experience) reported: "I was Crew Leader at night, at head of gully in open paddock. Fire jumped over us and lit up paddock beyond. Speed at which situation changed was beyond training." Another (male, 59, 21+ years experience) reported: "Caught in bush flashover (flames right over the top)." Another (male, 40, 6-10 years experience) reported: "I became briefly entrapped by a fence during a back burn. I now make sure I have a safe

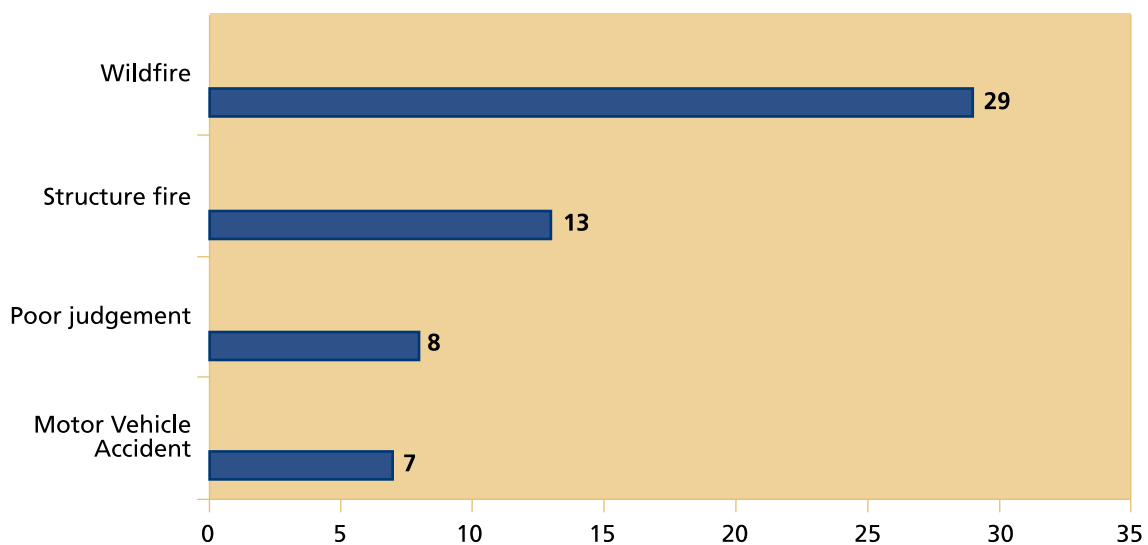
exit." Another (male, 20, 2-5 years experience) reported: "One incident where we were pulled out just before the fire came through, makes you take a bit more notice."

In the structure category participants reported such experiences as floor or roof collapses; flashovers; visibility hazards due to smoke or darkness and sparking powerlines. One male (18, 2-5 years experience) reported: "Falling through floors at structure fires, [now] I'm more careful of assessing possible situations". Another male (40, 21+ years experience) reported: "Once during a structure fire a partial ceiling/roof collapse heightened awareness of overhead dangers [for me]."

In the poor judgement category participants reported experiences such as being asked to do unsafe things; seeing others behave in an unsafe manner; experiencing a fuel flare up during training and almost being hit by a front end loader. As one male (36, 6-10 years experience) reported: "I've seen unsafe actions and attitudes of other people on the fire ground in regards to safety and thinking." Another (male, 40, 2-5 years experience) said: "People panic – settle them down and think about what you have learned."

In the motor vehicle category participants reported experiences such as LPG tanks "bleveing" or leaking and tyres exploding. One participant (male, 39, 10-20 years experience) reported: "A gas leak in the boot of a car. It was surrounded by houses during winter and the gas was like a fog around the building." Another (male, 18, 1-2 years experience) reported: "I ran to a car fire with no water and a tyre went bang and I took a few steps backwards."

Figure 1. Categories and frequency of threat experiences among 60 firefighters (3 cases unclassified).



Approach to safety

In response to the question as to whether the increased emphasis on safety issues had changed the way that they approached fires and incidents 65% of the sample (n = 72) said “yes” and 15% (n = 17) said “no”. No response was given to this question by 12% of the sample (n = 13) and 7% (n = 8) wrote that they had not changed their approach because they had always been safety conscious.

Table 2 shows the categories of change in approach identified by participants. Only percentages have been shown because categories identified are not independent, e.g. if a participant identified more than one way in which their approach had changed this was counted within the category, therefore percentages total greater than 100.

One participant (male, 47, 21+ years experience) commented: “I think a little more before “rushing in” – no more Harry Hollywood.” Another (male, 47, 6-10 years experience) commented: “Minimum Skills [training] has had a marked effect on my assessment of risks in respect of personal safety.” Another (male, 52, 21+ years experience) reported: “After serious burns – now try to get full details of fire and causes and effects before starting jobs – not always easy to do.” Another (male, 37, 2-5 years experience) commented: “When I am requested or asked to do something it would be a good idea to ask as many questions as possible to ascertain the level of risk and the objectives.”

Association between a risk experience and approach to safety

In order to determine whether experience of risk was associated with reporting a change in approach to safety on the fire ground a chi-square analysis was performed. Chi-squared compares the observed frequency of a category against the expected frequency of that category if category membership were randomly distributed. Chi-squared (df = 4) was found to be 58.47 (p < .001). Those who had had a risk experience were significantly more likely to report that they had changed their approach to safety on the fire ground compared to those who had not had a risk experience.

Risk experience and risk perception

Independent samples t-test results showed that those participants who had had a risk experience identified a significantly greater total number of risks across all scenarios (M=32.43, SD=11.59) compared to those who had not had a risk experience (M=28.25, SD=7.7) (t(108) = 2.24, p < .05). Participants who had had a risk experience were also significantly more likely to identify failure to follow procedure (M=2.77, SD=1.20) as a risk compared to those who had not had a risk experience (M=2.25, SD=1.18) (t(108) = 2.4, p < .05) and were significantly more likely to identify instability of the situation as a risk (M=4.24, SD =.97) compared to those who had not had a risk experience (M=3.86, SD=1.02; t(108) = 1.06, p < .05).

Table 2. Categories and frequency of threat experiences among 60 firefighters (3 cases unclassified).

In what way has approach to fires and incidents changed?	%
I “stand back” more on scene	43
I prioritise safety before any other decision	37
I emphasise and participate in training of myself and others more	25
I am more careful with wildfires (e.g. I consider the risks of low water, falling trees, wind change)	14
I am more careful when entering structure fires (e.g. I consider the risks of flashover/collapse and the use of breathing apparatus)	11
I am more careful in using appropriate Personal Protective Equipment (e.g. I double glove at motor vehicle incidents, ensure everyone helmeted)	5

Discussion

It is clear that threat experiences are common on the fire ground. More than half of the fire fighters sampled had had a threat experience. Consistent with worldwide statistics on fatalities among fire fighters wildfire operations presented the greatest potential threat to life with almost half of threat experiences reported involving wildfire behaviour.

Consistent with Chamberlin's (2005) arguments it would appear that these experiences did constitute portal experiences for those sampled. Those who had had a threat experience were significantly more likely to report that they had changed their approach to safety and also identified a greater number of risks and specific risks related to human error (failure to follow procedure) and potential instability of the situation compared to those who had not had such an experience. Not only were threat experiences associated with an enhanced ability to "see" risk in scenarios they also arguably lead to a more sophisticated appreciation of the nature of likely risks. The mechanism whereby this change occurred is likely to be that experience of a potentially life threatening near-miss evoked a powerful affective response which meant that fire fighters now perceived fire ground risk in terms of a "hot" affect heuristic (Slovic & Peters, 2006) rather than in terms of a "colder" cognitive analysis (Gold, 1993).

Fire fighters reported that they were now more conscious of safety. In general the sample claimed to think more, assess risks more, "stand back" more and train more. While this is heartening it is arguable that any change is more likely to be the result of a portal experience than of safety campaigns themselves. The implications of these findings for fire agencies is the unfortunate conclusion that fire fighters are likely to learn best to take risks seriously only following exposure to actual risk. Obviously fire agencies cannot intentionally expose fire fighters to danger, however the above findings suggests that any fire fighter training should be as in-vivo as possible.

Chamberlin (2005) asks the question "can we transit the Portal without personal trauma?" (p.1) and encourages fire fighters to share their "portal stories" of how risk experiences have altered their perspective for the benefit of other fire fighters. Although most fire agencies have formal requirements and mechanisms for incident reporting these systems are notoriously underutilised by fire fighters. For example, the Linton Coroner's inquest (Johnstone, 2002) found that there had been a number of burn overs on the Linton fire ground, other than the one which killed five fire fighters, which had not resulted in injuries and had not been reported. Often

what constitutes an "incident" is undefined (leaving fire fighters confused as to whether an incident they have experienced warrants reporting), reporting of incidents is not monitored or deemed to be any one person's responsibility and there are often no follow-up procedures once an incident is reported.

Fire agencies could arguably make better use of the educational value of their own people's risk experiences in training novices to the fire ground. Threat experiences and near-misses that do not result in injury are unlikely to be formally reported as incidents. In the U.S. Facilitated Learning Analyses are increasingly being conducted of near-miss incidents in order to identify lessons that may be learned from these experiences. The U.S. Wildland Fire Lessons Learned Center has set up a website where fire fighters can post their own portal stories. Local fire agencies could emulate this on their own intranets to encourage the reporting of portal experiences that taught fire fighters important lessons but did not warrant formal incident reporting. Fire agencies could also broaden their definition of an "incident" to include any experience where fire fighters felt that their life was potentially at risk.

Education campaigns are needed to promote the reporting of incidents and incident reporting should be made a responsibility of those in the chain of command. Importantly, once incidents are reported, formal follow-up procedures should be put in place to identify lessons learned and this information should be fed back by fire agencies to those on the ground.

These data present a conundrum to fire fighting agencies who must grapple with the question of how they best train fire fighters to take seriously the reality of threat on the fire ground, short of actually exposing fire fighters to real life-threatening experiences. Human beings are prone to numerous cognitive biases when assessing risk (Holgate and Clancy, 2007), most notably, illusions of personal invulnerability and optimistic biases (Metcalfe, 1998; Gold, 2007). Fire agencies need to develop training programs that go beyond dry after-action reviews and impact on the "gut feelings" of fire fighters. Klein (2004) points out the value of personally engaging "war-stories" in the learning of rules and lessons in organisations. Fire agencies could make better use of the collective wisdom of their members in communicating the lessons to be learned from near-misses.

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About the authors

Alina Holgate is a consultant psychologist and has researched extensively in the areas of post traumatic stress disorder, decision making and risk perception on the fire ground and regularly contributes to fire fighter training.
Email: alinaladixon@optusnet.com.au.

David Clancy is Principal Consultant of Human Safety Systems Pty. Ltd. He has over 20 years experience as an operational fire fighter and has researched and published in the areas of occupational health and safety issues, decision-making and risk perception in emergency services. For more information please visit the website: www.humansafety.com.au.
Email: david@humansafety.com.au.

