

**Surviving a firestorm:
Sensemaking in an extreme environment**

ABSTRACT: *Organizations increasingly find themselves responding to unprecedented natural disasters that are experienced as complex, unpredictable, and harmful. So how do they make sense and manage during these events? Using a sensemaking approach, this empirical case analysis of a firestorm shows how two teams of firefighters made sense of an extreme event when their lives were threatened by flames. Through a social process of sensemaking, the study finds that the firefighters were able to identify sensemaking cues and construct frames at different times during the event, which lead to meaningful sensemaking. By doing so, this paper build new theory that shows the important role of sensemaking in recognizing cues and creating frames when trying to make sense during extreme events. In modern times where extreme events are occurring more frequently, this paper has important implications for sensemaking and organizing more generally insofar as it begins to show how teams operating in extreme environments can safeguard their ability to make sense and avoid a crisis being brought into existence.*

Keywords: Cues, equivocality, extreme environment, frames, sensemaking, teamwork.

Introduction

On Black Saturday (7 February 2009), a firestorm left Victoria, Australia devastated. Over 2000 homes were destroyed, 3 townships were razed and most poignantly, 173 lives were lost (Griffiths, 2010). While no firefighter lives were lost on Black Saturday individuals did sustain injuries and find themselves in life threatening situations. Hence, this study asks how did teams operational firefighters make sense of the extreme environment they faced on Black Saturday?

This paper examines the role of sensemaking amongst teams that work in extreme environments. I do so by examining the case study of a firestorm where two teams of firefighters saw their lives threatened when they became entrapped when responding to a call out in Kinglake West, one of the scenes of the most virulent fire behaviour on Black Saturday. Studies to date have shown that extreme environments are highly equivocal – confusing, ambiguous, volatile and uncertain – where occurrences interact with actors, systems, and routines in a manner that is often rapid, unpredictable, harmful, and sometimes on an unprecedented scale (Kruke & Olsen, 2005; Weick, 1988; 1999). Such events also manifest themselves in organizations in more normal environments when individuals find they encounter discrepant cues when new realities emerge such strategic change initiatives (Balogun & Johnson, 2005), surprises (Louis, 1980) and / or a reinterpretation of strategy (Dutton & Dukerich, 1991). These events can prompt actions and reactions from teams as they they struggle to make sense of a mismatch between what it is expected to occur and what really occurs. Sometimes this can create equivocality (and perhaps even crises) in organizations where the past bears little resemblance to present circumstances (Weick, 1993; Cornelisson, 2012). In the case of extreme events such as disasters, teams will often face an onset of equivocality is rapid, studies suggest that habits, routines and patterns become meaningless as individuals seek to interpret cues and enact a sensible environment. Studies have even shown that individuals and teams in the face of escalating crisis become so overwhelmed that they enact behaviours that exacerbate or even bring a disaster into existence – often with disastrous consequences (Weick, 1993).

Despite individuals echoing Weick's sentiment that: "I've never been here before, I have no idea where I am, and I have no idea who can help me" (1993, pp. 634-635), this study shows that, despite their constraints of working in an extreme environment, teams have the capacity and

capability to make sense in extreme environments even when circumstances have become suffused with dynamic complexity. This study shows that cues from the firefighters' collective experience and knowledge enabled them to make sense of what was happening and survive being entrapped by flames. By doing so they were able to resume firefighting and prevent the fires from bringing harm to local residents. Moreover, their actions also saved a property from being razed.

Sensemaking and Equivocality

Sensemaking is a social process where individuals create plausible meaning and understandings when they encounter equivocality and/or discrepant cues in their environment (e.g., Maitlis, 2005; Maitlis & Sonenshein, 2010). Usually sensemaking gives rise to “an intersubjective sense of shared meanings through conversation and non-verbal behaviour in face-to-face settings where actors seek to produce, negotiate, and maintain a shared sense of meaning” (Gephart, Topal, & Zhang, 2010: 284 – 285) as long as they remain able to interpret the cues from their environment. Studies have suggested that equivocality arises from discrepant cues when individuals and groups experience novelty (Cornelisson, Mantere & Vaara, 2014; Dwyer & Hardy, 2016), confusion (Allard-Poesi, 2005) ambiguity (Sonenshein, 2007), uncertainty (Balogun & Johnson, 2005). Usually it is also complex and unpredictable (Brown, Stacey, & Nandhakumar, 2008) which, when its onset is rapid, will create extreme environments where people lose their ability to make sense (Shrivastava, Mitroff, Miller & Miclani, 1988; Vaughan, 1990; Weick, 1993) – so much so that their actions which bring a disaster into existence or exacerbate an escalating crisis (Colville, Pye, & Carter, 2013; Cornelisson, 2012). Sometimes such actions have disastrous consequences for individuals, teams and organizations where ultimately “the sense of what is occurring and the means to rebuild that sense collapse together” (Weick, 1993, p.634).

In essence, in extreme environments, while sensemaking is required it can be difficult to enact. This is highly relevant within teams, which operate in extreme environments where they often encounter mismatches between expected, and actual results of action which sometimes means a disaster or crisis is unavoidable (Dwyer & Hardy, 2016). To date, studies suggest that extreme teams usually struggle to make sense of such circumstances or actually contribute to a sensebreaking moments – when individuals lose their ability to make present meaning through routines and

experience from the past (Weick, 1993).

Given the important role that extreme teams play in everyday life it is perhaps surprising that scholars have focussed less on instances where such teams actually make sense of highly equivocal circumstances and prevent a disaster from occurring. Moreover, it is also surprising that studies of extreme teams show how they contribute to sensebreaking moments during disasters as opposed to examining how they often manage to make sense in such a way that either averts or ameliorates the most harmful effects of equivocal and dangerous environments. Accordingly, my study explores the question: how do teams make sense of a life threatening situation in an extreme environment?

Review processes and sensemaking

While sensemaking is relevant to the ways that teams make sense of equivocal and dangerous environments (Weick, 1993), it is also an important part of review processes that often follow. Studies to date have emphasized the rituals associated with normalization of extreme events as organizations and governments seek to re-establish accountability for what has happened and legitimacy where there are perceptions of failure exist. Often, the outcome of such review is a plausible account of what happened. However such accounts are a reflection of “authorial strategies of selection and omission” (Brown, 2000, p. 49), which are sometimes lack sensitivity to individual and team recollections about what occurred during an extreme event. Therefore, there continues to be scope to for more studies of review processes, which occur at organizational level, which show how teams, which respond to extreme events, reflect and make sense of such events (Dwyer & Hardy, 2016). Accordingly this study explores how two teams of firefighters who became entrapped by a bushfire storm on Black Saturday – the day of Australia’s worst ever natural disaster – and how made sense of a life threatening situation. I do so by examining the experiences, which both teams recalled in an operational review process after they returned to a more normal organizational environment after Black Saturday. I therefore show how teams socially constructed sensemaking cues within frames at different times during entrapment, which enabled them to make sense of an equivocal and dangerous situation.

Methods and research design

I adopted a qualitative and interpretive approach to my study insofar as it seeks to examine

the way in which extreme teams “experience everyday life realities” and make sense of them (Gephart, 2004: 457) in a landscape that is generally regarded as the most bushfire prone in the world. I chose this approach because sensemaking is a social and interpretive process that emerges as a result of dynamic interaction between individuals (Brown, Ainsworth, & Grant, 2012; Brown, Colville, & Pye, 2012) whose subjective interpretations of everyday life cohere into a meaningful ‘reality’ (Berger & Luckmann, 1966). Accordingly my interpretative approach comprises qualitative methods which are sensitive to the social context of Black Saturday and concerned with understanding complex issues relating to firefighting teams which operate in highly equivocal and extreme environments (Eisenhardt, 1989; Gephart, 2004; Eisenhardt & Graebner, 2007).

I examine a single case study of teams operating in an extreme environment and conduct an analysis of their experiences as constructed in the text of the report in an operational review afterward. While a single case study limits generalization they are often used as a basis for building theory about behaviour in specific contexts (Eisenhardt, 1989). Moreover, the single case study enables the researcher to examine a rare phenomena or events in-depth (Eisenhardt, 1989). The various texts from this report are the “locales for the conduct of primary research” (Brown, 2004, p.95). I acknowledge that my primary data has already been collected as part of an organizational review process and synthesized into report. It is this synthesis in which I ground my analysis and theorizing (Bryant & Charmaz, 1997). Accordingly, when I infer sensemaking from this report I do not claim that it is truth, correct or even accurate. Rather, I recognize that the views and opinions in the report are subjective and attempt by its authors to construct an authoritative account of an extreme event. I like scholars before suggest that sensemaking manifests within “language, text and discourse” within different conversations, statements and documents (Gephart, 1997, p.588) in review reports which are a well established in the literature as a source of data for empirical study (Dwyer & Hardy, 2016; Gephart, 1997).

Data collection

All details of the event in this paper are taken from the review process report, which I have been granted permission to reproduce extracts. The review process was conducted as debrief where participants responded to questions from two facilitators about what had occurred. Given the life

threatening nature of the entrapment I did not seek to place participants in a position where they would relive traumatic events by collecting further data from interviews. Moreover, my aim was to understand how they made sense equivocality of an extreme event rather than verifying the content of the report as truth or fact. By doing so I accept the report as a plausible account of what occurred that enables me to remain close enough to my context while maintaining enough distance to problematize it (Alvesson & Sandberg, 2011).

[Insert Table 1 here]

Accordingly, I used the text from report of the review to code for the ways in which teams operating in extreme environments make sense of circumstances they faced on Black Saturday. I used an interpretative approach to analyze my data. Such an approach meant that through multiple readings of the report in conjunction with my understanding of the sensemaking literature I was able to identify “themes, meanings and patterns in textual data” (cf. Gephart, 1997, p.585), from which I constructed categories that signified the ways in which the teams made sense of the different events at different times which arose as a result of the their tankers becoming entrapped on Black Saturday. These categories were emergent, which enabled me to inductively derive theory about the ways in which both teams made sense of an extreme event.

[Insert Table 2 and 3 here]

Findings

The Black Saturday firestorm was a source of great equivocality for firefighters. Even before the day itself, a prolonged period of drought and a heatwave of sustained record breaking temperatures meant that the state of Victoria was highly combustible which created considerable anxiety within emergency management organizations. The worst fears of firefighters were realized when lightning strikes and arson attacks ignited the Victorian landscape on 7 February. The temperatures were the highest since recording began and with winds gusting at storm force Victoria witnessed complex and volatile fire behaviour which had never been experienced before which consequently gave rise to an extreme and dangerous working environment for firefighters.

This study focuses on two teams of firefighters who responded to a call out on Black Saturday to Coombs Road in Kinglake West – one of the sites of some of the most extreme bushfire

behaviour in on the day. When the crews responded they thought they were attending a local fire and not the main fire that was active in the area but the situation was constantly changing.

We heard someone over the radio say something about a spotfire on Jacks Creek Road, we didn't think it had anything to do with the Kilmore fire [which was the main fire burning in the area] (Crew Member 1).

As both tankers arrived at their destination at Coombs Road they noticed numerous spot fires were spreading in the area, which Tanker 1 began to suppress while Tanker 2 attended to a spot fire at another house close by. Tanker 2 continued their attack on small spot fires on Coombs Road.

However, as they progressed down the road they noticed that spot fires were beginning to alight behind them. While Tanker 2 did not feel threatened, it was clear to the firefighters in Tanker 1 that the environment was becoming volatile prompting firefighters to make meaning about what was unfolding.

When we [Tanker 1] were driving further down Coombs Road and had gone past where Tanker 2 [originally] was, I saw the fire behaviour up ahead and decided we shouldn't go any further. So we turned around and back to try and find Tanker 2 (Crew Member 2).

However, Tanker 2 had reached a second residence further on down the road where its crew leader was becoming aware that their environment was becoming volatile and had also been observing the escalating levels of threat. Rather than risk the well being of the crew by driving back through the spot fires on the road he made a decision that they would remain at the residence. Furthermore he advised Tanker 1 to retreat and not advance further down the road, which was ablaze with spot fires, and visibility was rapidly deteriorating which made driving conditions perilous. Despite this, the crew were able to enact various aspects of their training and experience which seemed to enable them to collectively make sense of what was unfolding. Furthermore the crew leader facilitated meaningful action through ongoing communication.

The conditions were really hard to see in, I could only really see the gravel window right in front of the vehicle but my crewleader helped by talking to me (Crew Member 3).

Even though Tanker 1 was surrounded by flame the crew they were eventually able to drive to safety. However, the situation became very serious and threatening for Tanker 2 when the crew noticed that the main fire in the area had reached their place of refuge on Coombs Road. The crew and

residents at the property were entrapped.

The flame height of the fire coming towards us was at least twice the height of the trees, at least 80 metres (Crew Member 5).

The situation was exacerbated when the crew lost radio communications so they were unable to receive situation reports from their incident control centre, which was advising all crews of a red flag warning comprising an extreme threat facing Coombs Road. Despite this, the crew and residents did not try to flee the fire. They remained as a cohesive team focussing on the aspects of their environment that they could control. Like their colleagues in Tanker 1, the crew enacted their training and began to defend the property and accompanying shed, which was aided by deploying a floating pump in the swimming pool.

We couldn't get on the radio. It was fully congested with other radio traffic and we knew that we can't rely on the radio (Crew Member 5).

We had just done a training session on the floating pump, which made a big difference when we really needed it (Crew Member 6).

However, as the fire burned out of control the crew's ability to make sense and continue to engage in meaningful action became more constrained. The shed on the property became engulfed with flame which meant a potential place of shelter was lost, a tree fell across the fire hoses and damaged them which hindered their ability to extinguish spot fires and most worryingly, the floating pump ran out of fuel leaving the firefighters with only a limited water supply which they had on board the tanker fight fires. So extreme was the environment that the firefighters almost lost their ability to make sense.

We were mesmerised by the flames and got stuck in our own little world, we lost sight of the big picture and not having communications certainly didn't help (Crew Member 7).

Despite this, the crew as a team returned to a state of situational awareness and again enacted their training and leveraged each other's experience. It seems that as the environment became more dangerous the teams did less firefighting and agreed on the most appropriate way of safeguarding their own health, safety and wellbeing. By doing so they made sense insofar as they engaged in behaviours which safeguarded their own wellbeing which meant that their situation was not exacerbated and they did not bring harm or additional risks into existence as a result of their actions despite being immersed in an extreme environment. To protect themselves from the embers, flame and radiant heat they (along with a local resident) retreated to the house for shelter where they

continued to observe their environment and agree on the most appropriate actions. By doing so they entered a more stable environment, which they left occasionally to move firefighting equipment to a safe spaces when the fire behaviour was not a threat to their wellbeing.

When it got too hot and we had fire everywhere we went back into the house with the owners and just sheltered there until the front passed. (Crew Member 8).

As the fire front passed the fire activity became less extreme and the crew were gradually able to begin to exert influence within their environment in two ways. First, they began attending to their firefighting equipment and second resuming fire suppression activities, which invariably resulted in the fires causing less damage.

After 20 minutes the fire activity subsided. We restarted the tanker pump and floating pump, mended the hose with duct tape and continued to extinguish spotfires and embers for about 20 minutes (Crew Member 10).

Even though the fire front had passed by the time the crew had returned to firefighting the environment was still extreme. Ash from ember attack, fogging and perspiration meant that protective eyewear became problematic to wear while smoke was giving rise to respiratory problems. Conditions were hazardous for the crew to such an extent that individuals were injured as they extinguished spotfires that were threatening their wellbeing.

The goggles and mask were no good. The goggles filled with sweat and smoke and got covered in ash. I couldn't see a thing. I ended up taking them off. I got flash burns to the eyes (Crew Member 11).

Only when enough spotfires were extinguished were the crew along with the residence owner and her son able to leave the property. Two crew members sustained flash burn injuries to their eyes, relatively minor facial and head burns along with some smoke inhalation. A third crew member suffered a shoulder injury. Despite the best efforts of the crews it seemed that there was dissatisfaction within the local community with the endeavours of the crews.

We copped some local criticism. We did the best we could (Crew Member 12).

On Black Saturday, eighty five percent of the houses on Coombs Road were lost and as well as, six lives. It is quite possible that the firefighting of the crew from Tanker 2 prevented further losses of life albeit that they themselves suffered injuries. It seemed that the preparation prior to Black Saturday meant that the crews had the necessary skills to interpret what was occurring when the firestorm arose.

We had pre-planned the crews for the day ensuring a mix of experience and skills and also physical strength also we had done an area familiarization exercise as part of training (Crew Member 13).

Furthermore, leaders within both crews made important decisions at key moments which meant a potentially sensebreaking moment was averted. It seems that anxiety and stress did not overwhelm the crews as crewleaders paired less experienced members with more experienced ones which gave rise to shared communication about what was occurring at different times during the entrapment.

I reckon the decision by the Tanker 2 crewleader to stay was an excellent one based on the situation at the time. There was no way they would have got back out plus the fact that he also warned us to get back because he could see the fire starting to crown (Crew Member 10).

Analysis

Despite finding themselves in the midst of an extreme environment my findings show how the crews of Tanker 1 and Tanker 2 made sense of equivocality. In the first instance it seemed that the crews *deduced* from cues that their environment was extreme which gave rise to first order sensemaking insofar as they framed different aspects of what was occurring. By doing so they took actions at different times during the day, which saw them, enact behaviours, which safeguarded their wellbeing and not exacerbate what was already a highly volatile environment.

[Insert Table 3 here]

In the second instance, after the crews had made sense of the equivocality in their environment they engaged in second order sensemaking insofar as they were able to take action which ameliorated the effects of the fires. It seems that the crews *induced* from cues, which were embedded in their training, and prior firefighting experience different frames, which enabled them to manage firefighting resources in such a way that prevented lives and property being lost to the fires.

[Insert Table 4 here]

In the first instance, the collective experience of the firefighters as a team seemed give rise to a shared sense of what was occurring. There was a diverse profile of experience across the groups, which seemed to be an important basis for observing and making sense of cues in an extreme environment. Furthermore, the crew suggested that during their training and development as

firefighters they discuss and reflect on the nature extreme fire events before they come into existence. While the findings suggest that the diversity of experience and skills within the fire crew was an important component of identifying cues on the day of the entrapment they also show that the crew leaders played in attaching meaning to such cues. By doing so, the crew leaders actions gave rise to patterns, routines and behaviours that the crews were able to use as the basis for first order sensemaking as it became clear that they faced a threat of entrapment.

Discussion

My findings provide new insights into the ways in which teams that work in an extreme environment make sense. My study challenges existing sensemaking theory (Cornelisson, Mantere & Vaara, 2014) insofar as it shows that teams operating in extreme conditions have the capacity to make sense by interpreting the equivocality they face by making intersubjective sense of the cues which emerge. Moreover, while existing studies have claimed that the past offers little guidance to the present and future in extreme environments (Maitlis & Sonenshein, 2010; Colville, Pye & Carter, 2013), my study shows that it facilitates meaningful action amongst individuals through the development of cues and frames , which ameliorated the harmful effects of risk. My findings show that when crew members of Tanker 1 and Tanker 2 found themselves in a life-threatening situation they were able to use their previous collective experiences to frame risks at different times. Hence it seems that the past offers an important basis for meaningful action insofar as the crew were able to manage the fires and leave the fireground safely, albeit with injuries while also ensuring that no harm came to two local residents. It seems that past routines were the only mechanisms available to the crew to make sense of the environment as it became transitioned from volatile to extreme.

While studies to date have been shown to challenge individuals' identities and hence their ability to enact a sensible environment (Weick, 1988, Vaughan, 1990; Dutton & Dukerich, 1991; Maitlis, 2005; Weick, Suttcliffe, & Obstfeld, 2005) my study suggests that by maintaining a firefighting identity crew 1 and 2 were able enact behaviours that avoided an extreme situation being or a disaster being brought into existence. While Weick (1993) suggests that firefighters at Mann Gulch lost their lives because they failed to follow orders and drop their tools my study suggests that maintaining a firefighting identity may have enabled the crews to enact routines that helped them

control their panic, fear and anxiety. By doing so, it seems that their sense of what was occurring never collapsed. As a result the crews never lost their ability to interpret equivocal cues and frame different aspects of their extreme environment, which in turn meant that they never lost their ability to maintain safe spaces through firefighting.

There has been considerable interest in the influence that disasters have on a team's ability to make sense (Turner, 1976; Weick, 1993; Vaughan, 2006). Surprisingly, fewer studies exist which examine the role of leaders during disasters and the role that they play in facilitating meaning for teams in extreme environments. My study shows how crew leaders prospectively made sense of the cues embedded in the weather forecasts, which suggested that Black Saturday was going to be an extreme. Accordingly, they ensured that less experienced crew members were paired with more experienced colleagues which seemed to facilitate collective sensemaking across the team. This is important, because existing studies have shown that emotional reactions to disasters often give rise to deviance amongst individuals which results in them harmful and sometimes tragic consequences (Vaughan, 1990; Cornelisson, Mantere & Vaara, 2014). Hence my study begins to highlight the important role of leadership in sensemaking, which I hope will give rise to further studies in future.

I recognize that there are limitations to my study. My findings are a product of my interpretation of text in a report. Like scholars before me, my findings and contributions are a subjective reflection of my qualitative and interpretive methodology. I also acknowledge that other texts such as public commentaries may have told a different story and that participants may hold a different private views about the event to those that they shared as part of the debrief afterward. Consequently, I can only propose how sensemaking occurs during an extreme event that will require further research to establish. Notwithstanding these limitations my study provides a basis for some promising future research. Extreme events present challenges for team-based sensemaking where cues about what is occurring may not be immediately obvious as equivocality levels rapidly escalate. Resilience is further tested when teams find themselves in a life-threatening situation where "the sense of what is occurring and the means to rebuild that sense collapse together" (Weick, 1993, p.634). Given the complex times we live in I suggest that organizations train teams identifying cues so that they can build frames around the equivocality the face in extreme and non-extreme environments.

Consequently, I encourage further research that actively involves those who have lived through extreme events in a variety of organizational contexts. Such studies may not only deepen our understanding of equivocality which prompts such events but also provide a basis for strategies to enable teams to identify cues and develop frames so that their ability make sense is safeguarded and not lost. Such studies may ameliorate the effects of extreme events and may even prevent them from coming into existence in the first place. Moreover, they may also provide the basis for the development of more effective and tailored peer support programs for teams, which regularly work in extreme environments (Creamer et al., 2012).

Conclusion

With atmospheric scientists predicting that bushfires are likely to become more frequent, complex and devastating (Birkman, 2006; Griffiths, 2010) it is likely that emergency management organizations will continue to face extreme environments in the future. Hence, individuals will need to continue to build sensemaking skills, which enables them to make meaning from even the most discrepant cues.

Table 1: Crew Profiles

Tanker 1 Crew	
Role	Experience
Crewleader	12 years
Driver	5 years
Crew Member	5 years
Crew Member	8 years
Crew Member	
Tanker 2 Crew	
Role	Experience
Crewleader	13 years
Driver	12 years
Crew Member	3.5 years
Crew Member	6 years
Crew Member	2 years

Table 2: Sensemaking at different times of the day

Sensemaking: Firefighters use cues, routines and frames as a basis for making sense of their environment at different times	
Example of sensemaking	Illustrative quotes
<p><i>Before the flame was ignited</i></p> <p>Firefighters seek to make sense from multiple information streams. They extract cues, which form a basis for further discussion about what is occurring.</p>	<p>It was a Total Fire Ban day. We were manning the station. We had prior informal discussions with Parks Victoria and we knew about the Kilmore fire. We were using a combination of information; Channel 61; Country Fire Authority (CFA) web-site; and ABC radio. There was no information from the CFA and no warnings. At approx. 1550hrs we heard (over the radio) the Whittlesea captain report of a spot-over (Crew Firefighter 1).</p>
<p><i>On the morning of the fire</i></p> <p>Crewleaders organize firefighters into crews with complementary</p>	<p>We had pre-planned the crews for the day ensuring a mix of experience and skills and also physical strength also we had done an area familiarisation exercise as part of training (Crew Firefighter 5).</p>
<p><i>Upon deployment (late morning/midday)</i></p> <p>Ongoing discussion of different occurrences amongst firefighting crews and expert knowledge of leaderships meant that they were able to interpret equivocality as risk levels escalated.</p>	<p>There is always confusion at the beginning of a job. There's not a formula or structure at the beginning. I don't know how you overcome it. We made decisions. We kept talking to each other, which really helped our teamwork, plus I had full trust in Tanker 2 crewleader. The intercom didn't work but everyone just kept talking to each other (Crew Firefighter 7).</p>
<p><i>Upon suppressing the fire (early afternoon)</i></p> <p>Firefighters were able to frame different aspects of their environment from which meant that they could observe cues and manage their safety by enacting their training routines.</p>	<p>The fire was all around us but not unbearable. On the way down (Coombs Rd) the heat was OK. On the way back it was a different story. All the training we have done helped us a lot (Crew Firefighter 6).</p>
<p><i>Upon encountering volatile fire behaviour (mid-afternoon)</i></p> <p>Firefighters enacted their training routines to enable them to respond to escalating spot fires as conditions worsened.</p>	<p>I underestimated the fire behaviour – spot were fires escalating. Our own training kicked in (Crew Firefighter 6).</p>

Table 2 continued

<p><i>As the fire behaviour moved from volatile to extreme (late afternoon)</i></p> <p>Firefighters were able to frame different aspects of their environment from which meant that they could observe cues and manage their safety by enacting their training routines.</p>	<p>The fire was all around us but not unbearable. On the way down (Coombs Rd) the heat was OK. On the way back it was a different story. All the training we have done helped us a lot (Crew Firefighter 7).</p>
<p><i>As the fire behaviour became extreme (late afternoon)</i></p> <p>The crewleaders made critical decisions, which provided a basis for crews to examine cues and create frames, which meant their organization, remained stable and the ability to make meaning was never lost.</p>	<p>I reckon the decision by the Tanker 2 crewleader to stay was an excellent one based on the situation at the time. There was no way they would have got back out plus the fact that he also warned us to get back because he could see the fire starting to crown (Crew Firefighter 1).</p>
<p><i>In the midst of an extreme environment (late afternoon / early evening)</i></p> <p>The crews noticed cues signifying that their environment had become extremely dangerous and collectively agreed to seek shelter and strategically manage the fire by observing cues from a sheltered environment. This enabled them to enact safety routines, which eventually resulted in them leaving the fireground.</p>	<p>It was a good call when the floating pump stopped, to then go back into the house. We kept talking to each other and that helped plus we were all together (Crew Firefighter 3).</p>

Table 2: First order sensemaking

First order sensemaking: Firefighting crews at different times notice and observe cues from equivocal events which enable them to frame different occurrences in their environment and take meaningful action which protects their wellbeing.				
Equivocality	Temporality	Cue	Frame	Action
Crews are uneasy about the weather leading up to their call out on Black Saturday.	Before the firefighting crews had left their station.	Crews notice weather conditions are likely to result in a day of high fire danger.	Predictive frame: Crews recognize cues because weather forecasts are irregular.	Cues prompt crew anticipation being called out to fire events.
Crews are called to respond to spot fires when fire behaviour in the landscape is volatile.	As fire is ignited in the landscape.	Crews notice from radio messages that spotfires are spreading in the area.	System frame: Crews recognize the level of radio call out activity increases.	Cues prompt crewleaders to delegate specific roles within the firefighting crew.
Crews observe volatile fire behaviour not previously experienced	When the firefighting crews reach the destination of their call out.	Crews notice that they were being surrounded by spotfires.	Environmental frame: Crews recognize that fire behaviour is volatile.	Cues prompt crews to extinguish spotfires which threaten their wellbeing
Crews observe fire behaviour that threatens their wellbeing	After the crew arrive at the destination of their call out.	Crews notice that spotfires are occurring at a rate that is quicker than they can extinguish them.	Safety frame: Crews recognize the fire behaviour has become extreme	Cues prompt crews to focus less on firefighting and more on maintaining their health and wellbeing.

Table 3: Second order sensemaking

Second order sensemaking: Firefighting crews at different times notice and observe cues from equivocal events which enable them to frame different occurrences which enables them to manage and take action in an extreme environment .				
Equivocal events	Temporality	Cue	Frame	Action
Crews are concerned when a local bushfire merges with spotfires.	When they were extinguishing spotfires at a residence on Coombs Road.	Crews notice that a fire column had formed.	Firefighting frame: Crews recognize cues that a fire column moving towards them.	Cues prompt crew to seek shelter from the fire column.
Crew becomes entrapped by a bushfire burning out of control.	When the crew is sheltering the bushfire.	Crews notice the direction that the fire is burning.	Surveillance frame: Crews recognize that they can surveil their environment from a position of safety.	Cues prompt crew to remain in a safe sheltered environment.
Crews observe break opportunities to enable them to return to firefighting.	When sheltering from the bushfire and observing the fire behaviour in the open environment when conditions allowed them to do so.	Crews noticed that they can engage in firefighting from the areas that the fires have burned.	Professional frame: Crews recognize that they can use their skills as firefighters to operate effectively in an extreme environment.	Cues prompt crews to return to suppressing spot fires.
Crews return to outdoor firefighting	After the main firefront has passed.	Crews notice that they can move firefighting appliances to a safe space and return to firefighting around certain parts of the fire.	Maintenance frame: Crews recognize that firefighting appliances can be repaired and used for resuming firefighting	Cues prompt crews to refocus on firefighting and exit the environment with two members of the local community.

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