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We have not lived long enough: Sensemaking and learning from bushfire in Australia

By

Graham Dwyer & Cynthia Hardy

Abstract

Organizations increasingly find themselves responding to unprecedented natural disasters that are experienced as complex, unpredictable and harmful. We examine how organizations make sense and learn from these novel experiences by examining three Australian bushfires. We show how sensemaking and learning occurred during the public inquiries that followed these events, as well as how learning continued afterwards with the help of ‘learning cues.’ We propose a model that links public inquiry activities to changes in organizational practices. Given the interesting times in which we live, this model has important implications for future research on how new organizational practices can be enacted after public inquiries have concluded their work.

Keywords: Novelty, public inquiries, sensemaking, organizational learning

Introduction

Over the last decade, the earth's natural environment has provoked a growing and justifiable level of concern over our ability to cope with major catastrophes (Pelling, 2010). Atmospheric scientists are attributing higher temperatures, wind speeds and moisture deficits to climate change, which is subsequently causing natural disasters that have become more frequent, complex and devastating (Birkman, 2006). Hence, in the last decade we have witnessed earthquakes, flooding, droughts and bushfires becoming more frequent and more damaging (Glade et al., 2010). Such natural disasters are proving to be a challenge for emergency management practitioners, including government ministers, policy-makers, police officers, fire fighters, weather forecasters and geospatial analysts. Despite being well prepared, organizations still struggle to respond effectively to natural disasters (Mileti, 1999) because their learning from previous events is undermined when new or unfamiliar conditions unfold.

Natural disasters are what Weick (1988) refers to as high impact-low probability events, meaning that they interact with actors, systems and routines in the organizational environment in a manner that is often rapid, unpredictable, harmful and on an unprecedented scale. Such disasters impose significant losses and damages on communities globally. Nevertheless, and perhaps surprisingly, critics argue that they have received less scholarly attention than 'man-made' crises in organizational, industrial or political contexts (Sellnow et al., 2002). This study therefore looks specifically at the case of natural disasters to explore how organizational sensemaking and learning unfold in situations where actors struggle with novel conditions. It does so by examining the case of bushfire in Victoria, Australia.

In a normal year, during the summer months, Australia is prone to high levels of bushfire risk and there are times when such risk is greatly exacerbated by the early onset of summer, prolonged drought, high wind speeds and low humidity. These conditions mean that,

when fire is ignited, it creates what Colville et al. (2013: 1201) refer to as ‘circumstances that are suffused with dynamic complexity’. Three such bushfires that continue to live in the collective memory of Victorians are the focus of this paper: the Black Friday Fires, 1939 (71 lives lost); the Ash Wednesday Fires 1983 (75 lives lost: 47 in Victoria and 28 in South Australia); and the Black Saturday Fires 2009 (173 lives lost). In each case, the organizations responsible for managing these fires faced conditions that, despite their experience with bushfires, were experienced as surprising, overwhelming and rare. They represented what Weick (1993: 634) refers to as cosmology episodes, when ‘the sense of what is occurring and the means to rebuild that sense collapse together’. Many of those who lived through them express sentiments that echo Weick (1993: 634–635): ‘I’ve never been here before, I have no idea where I am, and I have no idea who can help me’.

Our study shows how the inquiries that followed each of these fires constructed them as novel, justifying the need for retrospective sensemaking and learning through deliberative public inquiry processes. It shows how sensemaking and learning occurred during the inquiries, as well as suggesting how ‘learning cues’ provided a basis for the double loop learning that occurred during the inquiry to extend beyond it and led to changes in organizational practices. In this way, our study responds to the call for research to explore the theoretical and practical importance of how actors ‘learn to make sense, and make sense to learn’ (Colville et al., 2013: call for papers). It makes the following contributions. First, it provides an empirical exploration of sensemaking and learning associated with three natural disasters that were described as unprecedented, dynamically complex events. Second, it shows how both sensemaking and learning can occur through the process of holding public inquiries. This is important because most of the theoretical focus on public inquiries has been in relation to sensemaking; we know far less about whether and how inquiries engender learning. Third, our study develops a general model that sets the stage for future research on how new organizational practices come into being after inquiries have concluded their work.

The remainder of this article reviews the literature on sensemaking and learning, with a particular focus on public inquiry processes. It then explains the methods associated with our qualitative, interpretive study of three bushfires. We then present the findings and develop a model of sensemaking and learning. Finally, we discuss the implications.

Sensemaking

Sensemaking is ‘an ongoing process that creates an intersubjective sense of shared meanings through conversation and non-verbal behavior in face to face settings where actors seek to produce, negotiate and maintain a shared sense of meaning’ (Gephart et al., 2010: 284–285). It comprises two primary concepts (Weick, 1995). First, the *sensing* component is built on the premise that actors draw on their lived experience, which is informed by their identity, and influences how they respond to stimuli such as events, triggers and surprises (Weick et al., 2005). Cognitively, actors struggle to respond in a meaningful way in an environment where events are perceived to be novel, triggers are seen as sudden, and surprise is experienced as continuous because existing cues and frames offer little or no insight into what is unfolding (Colville et al., 2012; Colville et al., 2013). Second, the *making* component is built on the premise that people attempt to enact or create, sensible environments, through ‘conversational and social practices’ (Gephart, 1993: 1469) about specific events to arrive at an understanding about what is plausible, rather than objectively accurate (Weick, 1995). Actors use questioning, framing, bracketing and storytelling to give meaning to organizational issues in a way that provides the basis for action, even during crises and disasters (Brown and Jones, 2000; Maitlis, 2005).

Crises and disasters trigger ‘sensebreaking’ moments where people lose their ability to impose meaning on events and routines are interrupted (Mantere, et al., 2012). As a result, they also provide powerful conditions for sensemaking as people ask: What is going on? (Weick, 1993) This questioning provides the opportunity to create new meanings, allowing

individuals to understand their experiences and, if there is consensus, facilitate co-ordinated action (Weick, 1995). However, when individuals fail to understand the implications and lessons to be gleaned from major crises and disasters, they are likely to engage in behaviors with unintended or even tragic consequences because they are confronting novel situations that they do not know how to gauge, process and manage (Weick, 1990).

Learning

The concept of organizational learning suggests that organizations learn from previous experiences in the same way as individuals share mental modes that detect and correct errors by altering the organization's theory of action (Argyris and Schön, 1996). Such learning is triggered when actors experience:

[A] surprising mismatch between expected and actual results of action and respond to that mismatch through a process of thought and further action that leads them to modify their images of organization or their understandings of organizational phenomena and to restructure their activities so as to bring outcomes and expectations into line, thereby changing organizational theory-in-use (Argyris and Schön, 1978:16).

Hence, organizational learning occurs to the extent that actors extract knowledge from systems at the individual and group levels of the organization (Argyris, 1976) so that change can be made in an evidence-based manner through intuiting, interpreting, integrating and institutionalizing (Crossan, et al., 1999) in ways that identify and correct errors.

Argyris (1976) argues that such learning occurs in two ways. First, single loop learning occurs through error correction, but without altering the underlying governing values of the system and/or organization. Second, double loop learning occurs when errors are corrected by changing governing values and subsequent actions. Thus single loop learning produces change within the existing organizational culture, while double loop learning leads

organizations to re-evaluate governing values and, potentially, change the culture and practices more fundamentally. Moving from single loop learning to double loop learning allows organizations to adjust their culture so that they can escape the clutches of ‘cultures of entrapment’ which produce antilearning (Sutcliffe and Weick, 2003: 73). Antilearning occurs when an organization’s members remain blind to incompetencies and inefficiencies, resulting in inadequate performance that can harm the organization and its stakeholders (Argyris, 1993; Argyris and Schön, 1996).

Public inquiries, sensemaking and learning

Sensemaking and learning are both relevant to public inquiries. Research has found that, in addition to the sensemaking that occurs (or fails to occur) during both natural and man-made disasters (e.g., Weick, 1993), sensemaking also takes place in the public inquiries that often follow (e.g., Brown, 2000; Brown and Jones, 2000; Gephart, 1984). In reviewing what happened during the disaster or crisis, public inquiries make sense of it, often in ways that establish accountability, rebuild public confidence and restore an organization’s legitimacy where failure is evident. Much of this research, accordingly, emphasizes the ceremonial and ritualized nature of inquiries and the way in which they create normalized versions of the ‘truth’ (Brown, et al., 2015). Consequently, through rhetorical accounts, public inquiries will often protect the dominance of powerful organizations, often at the expense of individuals (e.g., Brown, 2004; Gephart, 1993).

Some researchers claim that the ritualized and political aspects of public inquiries serve to inhibit learning (e.g., Buchanan, 2011). Nevertheless, public inquiries are generally expected to result in some form of learning and lead to changes in subsequent practices in order that organizations might respond more effectively in the future (Elliott, 2009). Moreover, some studies have demonstrated that public inquiries of disasters *do* prompt managers to implement change. For example, Bowman and Kunreuther (1988) show how

data generated from multiple public inquiries triggered safety management initiatives in a 500 Fortune chemical company. Similarly, Turner (1976: 381) demonstrates how ‘cultural readjustment’ occurred in UK state organizations following the Aberfan coalmine accident in Wales (1966-67), the Hixon level crossing collision in England (1968) and the Summerland leisure complex fire in Isle of Man (1974). However, we still know relatively little about how sensemaking and learning during a public inquiry lead to organizations being better prepared for the future. This study therefore explores the relationship between sensemaking and learning activities during public inquiry processes after dynamically complex events, as well as examining the processes leading to changes in organizational practices that occur after inquiries have run their course.

Methodology and research design

Our research is qualitative and interpretive insofar as it examines ‘the meanings in use by societal members to explain how they directly experience everyday life realities’ and examines how particular meanings become shared (Gephart, 2004: 457). We chose such an approach because sensemaking and learning can be considered to be interpretive processes (Argyris, 1978; Gephart, 1993; Maitlis, 2005; Brown et al., 2015) and we are interested in how public inquiries create meanings for the events that give rise to them, as well as for the changes that may follow them. We examine three case studies of bushfires and conduct a textual analysis of the reports produced by three public inquiries. In doing so, we recognize that a public inquiry report is:

an artefact that has resulted from authorial strategies of selection and omission of material, and which makes use of rhetorical devices ... to present *an* (not the only) understanding of events (Brown, 2000: 49).

Inquiries are ceremonial events with certain ritualized procedures (Gephart, 1984), embedded in a particular cultural and legal context (Brown, 2000), whose aim is to produce accounts

that are plausible, verisimilitudinous, and authoritative (Brown, et al., 2012). Accordingly, when we infer instances of sensemaking and learning from such reports, we do not claim that they are ‘correct’ or ‘accurate’ in their representation of events. Instead, we suggest that sensemaking and learning are ‘manifest in language, text and discourse including conversations, vocabularies, utterances and documents’ (Gephart, 1997: 588), and can therefore be discerned from the analysis of such language.

In addition to inquiry reports, we also analyze other texts that were related to the inquiries but produced afterwards as a form of ‘intertextuality’ (Fairclough, 1992). When texts draw on, react to and transform other texts, certain conclusions can be drawn. For example, in our analysis, when public inquiry reports were referred to in other texts, we were able to make inferences as to whether learning may have taken place. Similarly, insofar as these other texts reported on changes made (or not made) following the inquiries, they provided us with evidence for subsequent changes in organizational practices. In analyzing these texts in this way, we make no inference as to whether the learning was ‘correct’ or whether these changes actually worked. Nor do we use these texts as a form of triangulation, whereby multiple data sources are assumed to represent reality more accurately. Rather, we acknowledge that the views offered in these other texts are subjective and that each genre has its own institutionalized protocols, which shape the rhetoric of their accounts. Nonetheless, these data are still useful to explore learning during and after public inquiries. Finally, we recognize that this paper is, itself, an attempt to craft an authoritative account and we deploy rhetoric in ways consistent with the genre of a scholarly article in order to appeal to our particular audience (cf. Currie and Brown, 2003).

We selected the three case studies – the Black Friday Fires in 1939, the Ash Wednesday Fires in 1983 and the Black Saturday Fires in 2009 – because they were perceived to be three of the most significant and damaging natural disasters in Victoria, during which a considerable number of lives and properties were lost (Griffiths, 2010). It

therefore appeared likely that sensemaking would occur in the public inquiries that followed them, as in the case of other public inquiries dealing with crises (e.g., Gephart, 1984; Gephart et al., 1990; Brown, 2000; Brown and Jones, 2000). Equally, we felt that we would be able to discern evidence of learning (or its absence) from inquiry reports and related texts insofar as public inquiries are expected to be an important vehicle for learning in Australia (Prasser, 1985); and Griffiths (2010) argues that these reports did have a significant influence on emergency management in Victoria. Finally, we felt that the analysis of three case studies would provide more robust findings than selecting a single event.

Data collection

We collected the reports of the public inquiries: the Report of the Royal Commission to Inquire into the Bush Fires of January, 1939 (Black Friday Bushfires; the Report of the Bushfire Review Committee, 16 February 1983) Ash Wednesday Bushfires; and the Report of the Victorian Bushfires Royal Commission 2009 (Black Saturday Bushfires). We augmented these reports with other texts that were related to the three public inquiries, but produced afterwards. Using Factiva, which is a search engine for newspaper articles, TV and radio transcripts, journals, etc., we identified 20 publicly available interviews with senior fire fighters, commissioners and politicians, 17 newspaper articles and 4 web-blogs (see Table 1). These texts were collected because they provided (albeit subjective) views of whether and how sensemaking and learning occurred both during and after the inquiries.

< Table 1 here >

Data analysis

An interpretive approach was used to analyze whether the texts contained evidence of sensemaking and learning and to explore the nature of these processes. Rereading the texts, and relating them to our understanding of sensemaking and learning from the literature, we were able to identify ‘themes, meanings and patterns in textual data’ (cf. Gephart, 1997: 585), from which categories were constructed. These categories became an emergent theory that

provided the basis for an inductively derived model showing patterns of sensemaking and learning (cf. Gephart, 1993).

In the first instance, we examined the public inquiry reports for evidence that the bushfires were perceived to be novel, given our interest in how sensemaking and learning occur in response to novel conditions of dynamic complexity. Table 2 shows how perceptions of novelty were inferred from references in the inquiry reports to the bushfires as ‘unprecedented’, ‘previously unseen’, ‘catastrophic’, ‘new’, unforeseen’, ‘unchartered’, ‘unknown’. By exploring the excerpts containing these terms, we were able to identify references to accounts by individuals who saw the fires as novel at the time, as well as instances where conclusions of novelty were drawn from the inquiries’ overall deliberations. The inquiry reports were then examined for evidence of sensemaking. Excerpts containing references to ‘understanding’, ‘listening’, ‘review’, and ‘deliberations’ were identified. We then explored these excerpts in more detail to see whether there was evidence that the process of receiving submissions, holding hearings, conducting deliberations and writing a report had served to make sense of the fires for those involved.

< Table 2 here >

The next stage of analysis was to look for evidence of learning. In the context of public inquiries, we conceptualized single loop learning in terms of explanations of what had happened and why during the bushfires. We therefore identified and explored excerpts in the inquiry reports containing references to terms like ‘learning’ ‘lessons’, ‘mistake’, and ‘experience’ – looking for evidence of such explanations. We conceptualized double loop learning in the context of the inquiry in terms of recommendations for more fundamental change. We therefore examined excerpts in inquiry reports containing references to ‘learning’, ‘continuous learning’, lessons learned’, ‘re-evaluate’, ‘review’ ‘fundamental’, ‘change’ and ‘system’ to identify and explore recommendations for fundamental change. We also identified double loop learning that extended beyond the inquiries in the form of

subsequent changes in emergency management organizations. To do so, we examined texts produced subsequent to the inquiries to see if they provided accounts of fundamental changes made after the inquiry and to identify independent views from experts, fire fighters, journalists and politicians as to whether such learning had taken place. We recognize that views of fundamental change – including our own – are subjective.

Finally, we explored the link between inquiry recommendations and subsequent changes in organizational practices. Here, we analyzed excerpts from inquiry reports detailing recommendations for fundamental changes; and compared them to accounts in subsequent texts detailing how these recommendations were implemented in the form of changes in organizational practices. In this way, we identified what we refer to as ‘learning cues’ in the inquiry reports, as texts produced after the inquiry referred back to certain recommendations in order to explain, justify or introduce changes in organizational practices.

Findings

In this section, we first show evidence of novelty, sensemaking and learning in relation to all three inquiries. We conclude by presenting the particular dynamics associated with each of the three fires.

Novelty and sensemaking

The analysis of the inquiry reports suggests that all three bushfires were interpreted as representing novel conditions that had not been experienced before. The reports conveyed this novelty by drawing attention to unprecedented antecedent conditions before and during the major fires. In all three cases, inquiry reports constructed the fire as so overwhelming that individuals could not make sense of it at the time. Such was the unprecedented nature of all three fires that actors struggled to frame what was going on, recognize cues and bring their existing knowledge to bear on the situation. All three reports concluded that these particular bushfires were novel, unprecedented events, based on witness accounts and expert

assessments of conditions at the time of the bushfire:

The speed of the fires was appalling. Balls of crackling fire sped at a great pace in advance of the fires, consuming with a roaring, explosive noise, all that they touched. Houses of brick were seen and heard to leap into a roar of flame before the fires had reached them. Some men of science hold the view that the fires generated and were preceded by inflammable gases which became alight (Report of Black Friday Inquiry; Parliament of Victoria, 1939: 5)

Inquiry reports argued that, because of this novelty, existing procedures had failed to contain the fires, allowing them to escalate significantly and detrimentally. The resulting loss of life and damage to property was so great that it should never be allowed to happen again,

Black Saturday wrote itself into Victoria's history with record-breaking weather conditions and bushfires of a scale and ferocity that tested human endurance. (Report of Black Saturday Inquiry; Parliament of Victoria, 2010: vii)

If novelty had made it difficult for emergency services to respond adequately to the fires at the time, then sense needed to be made of that novelty retrospectively, through the submissions, hearings and, ultimately, the inquiry report.

[T]he truly disastrous proportions reached on 16 February, 1983, constituted an unmistakable peak in the disaster record of the State. It was clear, therefore, that in spite of experience of past bushfires and the lessons learned from them, the events of the 1982/83 season needed careful analysis and evaluation. To this end, in conjunction with other initiatives, the Government decided to establish a Bushfire Review Committee (Report of the Ash Wednesday Inquiry; Parliament of Victoria, 1984: 2)

The inquiries helped to make sense of the past – the apparent novelty of the bushfire could

only to be understood through a post-hoc inquiry. However, this attempt at comprehension of past events was clearly made with a view to safeguarding the future.

We have seen the pain people have endured and continue to bear and, we know it will be a long road to full recovery for many. Bushfire is an intrinsic part of Victoria's landscape, and if time dims our memory we risk repeating the mistakes of the past. We need to learn from the experiences of Black Saturday and improve the way we prepare for and respond to bushfires (Report of Black Saturday Inquiry, Parliament of Victoria, 2010: vii).

In this way, the inquiry reports adopted a prospective outlook in relation to future learning.

I am determined that this Royal Commission report is never allowed to gather dust. It is crucial that we grasp the opportunity now to make our State safer. I am equally determined that the path forward unites all Victorians in one commitment to do all we can to preserve human life in the face of the threat of bushfires (Premier of Victoria, quoted in Department of Premier and Cabinet, 2010: para.10).

Single loop and double loop learning

In making sense of the bushfires, the inquiry reports also provided accounts that indicated single loop learning in the form of explanations of what had happened during each of the bush fires and why it had happened.

Except that the summer of 1938-39 was unusually dry and that it followed what had already been a period of drought, the causes of the 1939 bushfires have been immediate and remote causes. [I]t will appear that no one cause may properly be said to have been the sole cause. The major, over-riding cause, which comprises all others, is the indifference with which forest fires, as a menace to the interests of us all, have been regarded (Report of the Black

Friday Inquiry, Parliament of Victoria, 1939: 11)

There was also evidence of double loop learning insofar as some inquiry recommendations identified a need to re-evaluate systems that had been considered adequate before the unprecedented nature of fires exposed their limitations. The inquiry reports suggested that preparing for and responding to future bushfires on the scale of those recently experienced would require new practices, routines and, in some instances, new systems.

[W]e need to learn the lessons so that problems can be avoided in the future.

The Commission therefore examined the policies, systems and structures needed to ensure that government, fire and emergency services agencies and individuals make informed, effective decisions about their response to bushfires in a way that protects life and minimises loss. (Report of Black Saturday Inquiry, Parliament of Victoria, 2010: 4)

The inquiries were, then, a first step insofar as recommendations argued for a need for fundamental changes in the system of bushfire management that, in turn, would require changes in the practices of specific organizations.

A legacy for governments or a legacy for a fire leader I think will be to introduce these recommendations over time to avoid, as best we can, these sort of events that occurred on the seventh of February (Jack Rush, Queens Counsel assisting the Black Saturday Inquiry, interviewed by Fyfe, 2010).

Thus double loop learning extended beyond the inquiries as changes were implemented in organizations responsible for bushfire management. For example, a Park Ranger who had witnessed the Ash Wednesday Fires commented on changes that followed the public inquiry:

Ash Wednesday had jolted fire-fighting services to re-examine how they tackled bushfire. From communications, to the way we transport people, to the way we use aircraft, dozers, the way we configure people across the landscape. It made us look hard at that. It made us look at how we configure

our incident management teams, how we train people (McAloon, 2008: para. 15-16).

Similarly, changes were announced following the Black Saturday Royal Commission including: ‘reducing fuel load on public land while monitoring and carefully managing the ecological consequences of such action; maintaining strategic fire breaks to protect communities and their critical assets, such as water; limiting known fire-starting activities on days with a dangerous fire risk; and encouraging individuals living in unacceptably high bushfire risk areas to relocate to safer environments’ (Victoria’s Emergency Services Minister quoted in Department of Premier and Cabinet, 2011: para.10).

Learning cues

In tracing links between inquiry recommendations for fundamental changes and accounts of changes being implemented subsequently, we identified what we refer to as ‘learning cues’. Like sensemaking cues, learning cues are key fragments of information that serve as ‘stimuli that gain attention and engender action’ (cf. Colville et al., 2014: 217). They are not pre-determined or pre-existing but, rather, are constructed as actors draw on particular fragments of text from inquiry recommendations to explain, justify and initiate subsequent changes in organizational practices. In this way, learning cues appear to help extend the double loop learning that occurs during the inquiry to the wider setting, providing a basis for subsequent changes in organizational practices.

Sensemaking and learning in the three bushfires

In this section, we present a summary of the sensemaking and learning dynamics that characterize each of the three bushfires. In the case of Black Friday (1939), sensemaking constructed the bushfire as Australia’s worst natural disaster – a novel event compounded by a chronic drought and a lack of accountability. In making sense of this novelty, the inquiry engaged in single loop learning by offering explanations as to why the fire occurred and escalated to such a seemingly unprecedented extent. These explanations included the lack of

fire-related organizations with responsibility for managing risk in regional areas, an absence of forest management and conflict among various organizations. Recommendations included the need for a State fire authority, new guidelines for planned burning and clearer responsibilities for land and forest management. These proposals served as learning cues in that they were referred to in subsequent texts discussing changes in organizational practices. These changes included the establishment of the Country Fire Authority (CFA) whose jurisdiction included fires on private land in regional areas; the institutionalization of planned burning and the introduction of the 1939 Forest Act, giving the existing Forest Commission complete control of fire management on public land. These changes can be considered to involve double loop learning insofar as they changed the assumptions of emergency management in Victoria in ways that continue to the present day.

<Table 3 here>

In the case of Ash Wednesday (1983), we again observed that sensemaking constructed the bushfires as novel – the worst natural disaster to date owing to the early onset of summer and irregular fire behavior (Table 4). Single loop learning occurred insofar as explanations in inquiry reports explained the damage caused by the fire in terms of conservative planning on the part of the community, the need for more effective responses from emergency management organizations, and the need for better understanding of fire behavior. Recommendations regarding new education programs, new partnership arrangements and formal modelling of fire typologies served as learning cues in that they were referred to in subsequent texts discussing changes in organizational practices. These changes included a new ‘Stay or Go’ policy, which was an education program to assist communities living in high bushfire risk areas in their preparation for the fire season. Other changes involved new partnership arrangements and the institutionalization of fire modelling. These changes can be considered to involve double loop learning insofar as the ‘Stay or Go’ policy was developed collaboratively as a result of new partnership arrangements introduced

through legislation. It remained the cornerstone of Victoria's bushfire safety program for more than 25 years, while the new fire management strategy became established practice.

<Table 4 here>

Inquiry sensemaking in the case of Black Saturday (2009) constructed these fires as the country's worst natural disaster resulting from a severe heatwave and an absence of leadership in the line of command and control authority. Single loop learning explained the severity of the fire in terms of individuals lacking bushfire safety plans, the build-up of fuel, and the lack of clarification regarding the line of command and control authority. Recommendations regarding fire warnings, planned burn-offs and a review of the co-ordination of fire management organizations served as learning cues in that they were referred to in subsequent texts discussing changes in organizational practices. These changes included new forms of warning, defined burn-off targets and legislation for a new position of Fire Services Commissioner. Again, these changes can be considered to enact double loop learning insofar as they involved radical changes to existing policies and changes in the organization of the overall fire management system.

<Table 5 here>

Sensemaking and learning were thus embodied in the deliberative processes of the three public inquiries. Single loop learning resulted in explanations of what happened and why in inquiry reports, while evidence of double loop learning was found in the form of recommendations for more fundamental changes. Learning cues in the recommendations appeared to gain attention and engender action insofar as they were referred to in relation to subsequent changes in the practices of organizations responsible for bushfire management.

Discussion

Our findings allow us to propose a general model regarding sensemaking and learning during – and after – public inquiries as events move from natural disaster, through the public

inquiry deliberations and report, to the aftermath of the inquiry. See Figure 1.

<Figure 1 near here>

First, in all three public inquiries, novelty was attributed to particular circumstances in the natural environment that accounted for these ‘unprecedented’ natural disasters. At the same time, all three inquiries clearly indicated that similar conditions could be expected to occur again in the future. According to inquiry reports, these novel conditions had taken emergency management practitioners by surprise and inhibited sensemaking at the time. We propose that the construction of novelty helps to justify the need for a public inquiry to provide retrospective sensemaking in order to manage future conditions more effectively.

Second, sensemaking during the inquiry reduces the equivocality of the novelty in that it helps to create shared understandings, making it possible to construct plausible explanations of what happened and why. We therefore also propose that sensemaking provides the basis for single loop learning to occur during the inquiry, as well as double loop learning in the form of inquiry recommendations for more fundamental changes.

Third, for inquiries to lead to changes in organizational practices, double loop learning must extend *beyond* the inquiry. We propose that this process is facilitated by learning cues – stimuli that gain attention and engender action, signifying to others of a need for a specific change, and allowing actors to move from a state of disorder about past events to a new order about future events (cf. Colville et al., 2014) which, in turn, aids the introduction of changes in organizational practices following the inquiry.

Our model helps to develop new theory concerning the link between sensemaking and learning. Whereas Schwandt (2005) suggests that sensemaking and learning are in tension with each other, our study suggests that sensemaking is a basis for learning. Only after sense is made can learning occur. Additionally, whereas Schwandt (2005) suggests that sensemaking may preclude more fundamental learning because actors interpret equivocal cues to align with current knowledge, our study suggests that double loop learning can still

occur. There is, then, considerable scope for further research to explore the relationship between sensemaking and learning in more detail. The temporal component is particularly interesting (Colville et al., 2014). Our model suggests that, initially, sensemaking is high and learning low as actors struggle with equivocality. As sense is made, sensemaking activities reduce over time while learning increases, moving from single loop to double loop learning. Ethnographic studies of inquiries would be helpful in investigating the real-time dynamics of sensemaking and learning during the deliberative processes of an inquiry.

Our model also builds on the work of Colville et al. (2014) who show the links between sensemaking, learning and change within an organization. Our study shows how these activities can transcend organizational boundaries by ‘moving’ from the organization that is the public inquiry into the myriad of organizations that constitute its subject matter. In this regard, we introduce the concept of the learning cue, which appears to play a role in this transition. There has been considerable interest in sensemaking cues (e.g., Colville et al., 2013), and we feel there is potential for similar research into learning cues, which are similarly equivocal. What constitutes a learning cue – why are some textual fragments taken up and not others? How do they gain attention and engender action, and signify change to others? Do they serve a cognitive function in that certain textual fragments spark learning? Are they rhetorical insofar as some fragments of texts are most effective in persuading other organizational members of the need for change? Or are they political in that certain textual fragments gain political momentum and visibility, making it easier for organizations to implement them? Also, what happens when potential learning cues ‘fail’ and are not picked up? How does this affect the outcomes of an inquiry?

In sum, our model suggests that sensemaking and learning processes do not end with the inquiry report and, if organizations are to address novel events and turbulent conditions, sensemaking and double loop learning must extend beyond the inquiry (cf. Brown et al., 2015). Our model offers some proposals as to how this happens and suggests avenues for

future research. For example, more research is required to examine the process of ‘transitioning’ out of the inquiry into the organization. Does sense also have to be made of the inquiry and its report by organizational members before they can engage in double loop learning and introduce new practices? If so, how do these processes occur? What effect does the backdrop of the inquiry have? The construction of a disaster as a novel event appears to frame the sensemaking and learning that occurs during an inquiry; how, then, does the construction of blame and accountability that typically occurs during public inquiries frame the sensemaking and learning that follows? How does being called to appear in front of the inquiry influence organizational members responsible for implementing changes in organizational practices?

We recognize that there are a number of limitations associated with our research. First, our findings are a product of our interpretations of publicly available texts. Hence, like scholars before us, our findings and contributions are a subjective and idiosyncratic reflection of our qualitative and interpretive methodology (e.g., Brown, 2004; Gephart, 1993). Second, other texts may have told a different story: practitioners and politicians may have different private views than those expressed in public inquiries. Third, our inferences concerning double loop learning into the organizational setting are based on publicly available texts and not on direct interviews with, or observations of, organizational members. Also, our study includes no measurement of the effectiveness of the individual changes in preventing and managing bushfires. Our model can only propose relationships that will require further research to establish. Finally, we acknowledge that, like the texts on which we base our study, this article is itself an artefact, produced by our authorial strategies and use of rhetoric to produce a particular account (cf. Brown, 2000). These limitations notwithstanding, our study does suggest some promising avenues for future research.

Our model also has important practical implications. Developing and implementing new organizational practices is a difficult challenge for management practitioners,

particularly when the organization has lived through traumatic events such as a crisis (Pearson and Clair, 1998). Organization resilience is further tested when practitioners are called to give evidence before public inquiries and, in some instances, blamed for how they managed certain activities (see Vince and Saleem, 2004). To alleviate some of these challenges our paper suggests that practitioners might seek to identify learning cues which they can use to explain, justify and initiate change, a necessary first step in advancing double loop learning and developing new organizational practices. Our model also has implications for the conduct of inquiries whose commissioners have the vantage of hindsight not afforded to those practitioners managing the disaster at the time. Often these practitioners are blamed even though the inquiry report suggests that the event under review was novel (Gephart, 1993). We suggest that more procedural emphasis on sensemaking and learning during public inquiries, rather than allocating blame, may result in more robust learning cues that help practitioners to change organizational practices more easily. Consequently, we encourage further research that actively involves those who have lived through events like the ones described here. Such studies may not only increase meaningful learning, but also have a cathartic effect whereby actors can reflect on their experiences of a major event and broker them into learning and change, hence returning the organization to a new state of sense after turbulent times.

Conclusion

In the case of natural disasters, government and communities must continue to look to the future when engaging in sensemaking and learning to ensure that they are implementing change that is not blind to the risks ahead. History has the tendency to repeat itself – albeit in novel ways. It seems likely that emergency management organizations in Victoria will continue to be challenged by the novelty of climate change. As one Australian environmental scientist has commented:

Worryingly, since 2009 we have experienced more days of ‘catastrophic’ fire danger, and this number will very likely increase in the future. Fire frequency and intensity is also predicted to increase in already fire-prone areas – areas in which a large proportion of the Australian population lives (Flannery, 2013: para. 8).

The need to encourage and foster double loop learning remains an ongoing challenge especially since the impetus for change tends to drop away after the disaster in question fades from memory (Griffiths, 2010). Yet the experiences of those who have lived through such events should remind us of the need to continue to make sense and learn from them:

In the usual course of life you cannot gain experience without paying a price but in the experience of the many bushfire-affected families of this state and those in charge of the systems ... the price has been immeasurable ... It is tragic to pay the price for the experience and not learn the lesson (Ms Scherman who lost family members on Black Saturday, quoted in Parliament of Victoria, 2009b: xxiv).

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Table 1: Sources of textual data

Text source	Relevance	Number of sources
1. Inquiry reports	Inquiry reports provide detailed accounts of sensemaking over a period of time with input from government, emergency management and community stakeholders, and provide evidence of learning.	3 reports.
2. Publicly available interviews	Observers comment on whether they believe the public inquiry made sense of and learned lessons from the previous bushfire, as well as whether sensemaking, learning and change have occurred subsequently.	20 interviews with politicians, fire fighters, royal commissioners.
3. Media articles	Media articles provide commentaries on whether the public inquiry made sense of and learned lessons from the previous bushfire, as well as whether sensemaking, learning and change have occurred subsequently.	17 newspaper articles.
4. Web-blogs	Web-blogs provide commentaries on whether the public inquiry made sense of and learned lessons from the previous bushfire, as well as whether sensemaking, learning and change have occurred subsequently.	4 web-blogs by emergency management practitioners.

Table 2: Illustration of codes and quotes for key themes

Indicative codes	Quotes
<p>Novelty References to a bushfire that was ‘unprecedented’, ‘previously unseen’, ‘catastrophic’, ‘new’, ‘unforeseen’, ‘unchartered’, ‘unknown’.</p> <p>Analysis of excerpts from inquiry reports undertaken to discern whether and how the bushfire was constructed in relation to novelty.</p>	<p>Report of Inquiry: 1939 Black Friday ‘There had been no fires to equal these in destructiveness or intensity in the history of settlement in this State, except perhaps the fires of 1851, which, too, came at summer culmination of a long drought’ (Parliament of Victoria, 1939: 6).</p>
	<p>Report of Inquiry: 1983 Ash Wednesday ‘[T]heir extent and severity, especially in terms of the truly disastrous proportions reached on 16 February 1983, constituted an unmistakable peak in the disaster record of the State’ (Parliament of Victoria, 1984: 12).</p>
	<p>Report of Inquiry: 2009 Black Saturday ‘Although the fires of January–February 2009 were catastrophic, they were not the first fires to gravely affect the State of Victoria. The outcome of these fires, however—especially the loss of life—surpassed that of past fires’ (Parliament of Victoria, 2010: xvi).</p>
<p>Sensemaking References to the bushfire that referred to ‘understanding’, ‘listening’, ‘review’, ‘deliberations’.</p> <p>Analysis of excerpts from inquiry reports undertaken to discern evidence of sensemaking.</p>	<p>Report of Inquiry: 1939 Black Friday ‘To enable a report of full effect to be made, it would be necessary to inquire into and resolve the preliminary problem of the co–ordination of control of forest lands by, and recognition and preservation of the rights of, the various persons and departments whose interests are rooted in the soil of the forests; to inquire into the constitution and administration of some of these departments;...’ (Parliament of Victoria, 1939: 7).</p>
	<p>Report of Inquiry: 1983 Ash Wednesday ‘The aim of this report therefore is to consider factors relevant to the bushfires which occurred in Victoria during the 1982/83 season particularly those of 16 February 1983 and to make any necessary recommendation for countering disaster situations in the future’ (Parliament of Victoria, 1984: 4).</p>
	<p>Report of Inquiry: 2009 Black Saturday ‘As Commissioners, we concentrated on gaining an understanding of precisely what took place and how the risks of such a tragedy recurring might be reduced’ (Parliament of Victoria, 2010: vii).</p>
<p>Single loop learning References to ‘learning / lessons’, ‘mistake’, ‘experience’</p> <p>Analysis of excerpts from inquiry reports undertaken to discern evidence of single loop learning in the form of explanations of what happened and why.</p>	<p>Report of Inquiry: 1939 Black Friday ‘Except that the summer of 1938–39 was unusually dry and that it followed what already had been a period of drought, the causes of the 1939 bushfires were no different from those of any other summer. There were, as there always have been, immediate and remote causes. The major, over–riding cause, which comprises all others, is the indifference with which fires, as a menace to the interests of us all have been regarded ...’ (Parliament of Victoria, 1939: 11).</p>
	<p>Report of Inquiry: 1983 Ash Wednesday ‘It was clear, therefore, that in spite of experience of past bushfires and the lessons learned from them, the events of the 1982/83 season needed careful analysis and evaluation’ (Parliament of Victoria, 1984: 2).</p>
	<p>Report of Inquiry: 2009 Black Saturday ‘The resultant evidence is the most comprehensive ever assembled about the circumstances of deaths in an Australian bushfire. It thus offers an unprecedented opportunity for analysis. Looking back on the experience of 7 February, it is plain that on such days, when bushfires are likely to be</p>

	ferocious, leaving well before the fire arrives is the only way of ensuring one's safety' (Parliament of Victoria, 2009: 334).
<p>Double loop learning References to 'learning', 'continuous learning', 'lessons learned', 're-evaluate', 'review' 'fundamental', 'change', 'system'.</p> <p>Analysis of excerpts from inquiry reports undertaken to discern evidence of double loop learning in the form of recommendations for fundamental change in bushfire management systems.</p> <p>Analysis of excerpts from subsequent texts undertaken to discern accounts of change and views that learning occurred.</p>	<p>Publicly available interview: 1939 Black Friday 'Fire-fighters are now trained to know when to retreat or leave, and they have the right back-up and support. None of those systems were in place then' Steve Bracks, past Premier of Victoria.</p>
	<p>Publicly available interview: 1983 Ash Wednesday 'As a nation, did we learn from the experience? Of course we did. But that was never going to be enough. [I]t is the work of our bushfire scientists over the last two decades ... that has made the greatest contribution to saving lives and property.' Gary Morgan, past Chief Executive of the Bushfire Co-operative Research Centre (Bushfire CRC).</p>
	<p>Publicly available interview: 2009 Black Saturday 'The 2009 bushfires were subject to an exhaustive Royal Commission of Inquiry. That led to a series of fundamental changes, many of which are largely invisible to the public eye. But they are fundamental.' Craig Lapsley, current Emergency Management Commissioner.</p>
<p>Learning Cues Analysis of accounts from subsequent texts referring back to recommendations in inquiry reports to explain, justify or initiate changes in organizational practices.</p>	<p>Publicly available interview: 1939 Black Friday '[I]t was a turning point in terms of structure and arrangement for fire prevention and fire suppression because when you look at the model [which included a state fire authority, planned burning and clearer responsibilities] which was proposed as a result of the 1939 Royal Commission ...' Russell Rees, past CFA Chief Officer.</p>
	<p>Web-blog: 1983 Ash Wednesday 'The 1983 Ash Wednesday bushfires also provided a range of experiences to build upon. The suddenness, the velocity and the deadliness of those fires added considerable urgency as far as our need to know more about a range of variables such as fire behaviour and fire weather [referring to the need to model fire behaviour]. We needed better guidelines on how to manage the land for both bushfire protection and for its conservation value [referring to formalizing the management of major emergencies]' Gary Morgan, past Chief Executive of the Bushfire CRC.</p>
	<p>Publicly available interview: 2009 Black Saturday 'The primacy of human life is more obviously at the forefront of all of our activities. That is why the advice to leave a high bushfire area well in advance of a bushfire threat is so prominent in our communications. It is the safest option. Likewise, information and advice to the public is delivered in an integrated and varied way. The advice is as timely and relevant as it can be. The means of delivering this are improving all the time [referring to the need to review of 'Stay or Go' policy]' Craig Lapsley, current Emergency Management Commissioner.</p>

Table 3: Summary of findings from Black Friday 1939

<i>Construction of novelty</i>	<i>Sensemaking and single loop learning</i>	<i>Learning cues</i>	<i>Double loop learning and new organizational practices</i>
Australia's worst natural disaster.	The fire occurred and escalated because no fire-related organizations had responsibility for managing risk in regional areas.	Recommendation for a State fire authority to educate citizens about the risk of fire in regional areas and to coordinate training of volunteer fire fighters.	The CFA comes into existence in 1945 to manage fire in regional areas on private land.
Chronic drought.	The fire occurred and escalated because there an absence of forest management.	Recommendation for new guidelines for planned burning off of growth to reduce fuel hazards.	Planned burning is instituted as a fire management strategy.
Absence of organizational accountability.	The fire occurred and escalated because of intra-organizational conflict.	Recommendation for clearer responsibilities among land and forest managers.	The 1939 Forests Act gives the Forest Commission complete control of fire management on public land in Victoria.

Table 4: Summary of findings from Ash Wednesday 1983

<i>Construction of novelty</i>	<i>Sensemaking and single loop learning</i>	<i>Learning cues</i>	<i>Double loop learning and new organizational practices</i>
Australia's worst natural disaster.	The fire caused so much damage and loss because the community had become conservative about planning for the risk of bushfire.	Recommendation for new education program to educate people about fire risk and bushfire preparedness.	The 'Stay and Defend or Go Early' policy is adopted.
Early onset of summer.	The fire caused losses and damages may have been less if fire management organizations were able to respond more effectively the rapid onset of bushfires.	Recommendation for new partnership arrangements between fire management organizations.	The 1986 Emergency Management Act implements a formal partnership approach to managing major fires.
Irregular fire behavior.	The fires highlighted a need for a better understanding of fire behavior.	Recommendation for formal modelling of fire typologies in different terrains to improve planning and preventative action against bushfire.	Fire modelling is instituted as a fire management strategy.

Table 5: Summary of findings from Black Saturday 2009

<i>Construction of novelty</i>	<i>Sensemaking and single loop learning</i>	<i>Learning cues</i>	<i>Double loop learning and new organizational practices</i>
Australia's worst natural disaster.	The actions of many people living in high fire danger areas on the day of 7 February 2009 showed that they did not have a robust bushfire safety plan.	Recommendation for a review of the 'Stay or Go' policy and implementation of new technology to provide timely and relevant information to communities potentially at risk.	Warnings are now issued to correspond with potentially harmful fires on severe fire days.
Severe heatwave.	The fires were exacerbated by a build-up of fuel such as desiccated flora communities and vegetation growth.	Recommendation for fire management organizations to burn a rolling target of 5 per cent minimum of public land.	There is now a defined target of land, which must be burned each year with an appraisal of how this activity is contributing to mitigating bushfire risk.
There was an absence of the authority and leadership and command and control.	The severity of the fires showed that emergency management command and control structures needed role clarification.	Recommendation for a review of how fire management organizations activities are coordinated and controlled.	The 2010 Fire Services Commissioner Act established a new Fire Services Commissioner whose role is to coordinate and oversee the activities of fire management organizations.

Figure 1: Sensemaking and learning

