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Mental models, which include our assumptions about how the world works, influence how we experience extreme events, such as the Australian bushfires. In turn, they can be altered by those experiences. Understanding (changes to) our mental models can help communities plan for, and recover from, extreme events.

Introduction

The year 2020 has seen some significant changes across our social, ecological, and economic landscapes. Two events stand out: the Australian bushfires, which burned an area in excess of 200,000 km² and killed more than one billion vertebrates; and the coronavirus disease 2019 (COVID-19) pandemic, which has infected people in almost every country in the world, closed national borders, and brought economies to a standstill. The sky changed from an eerie yellow to pitch black within a matter of hours. We were surrounded by fire; we had no possibility of escape and had to wait for whatever came. Having never experienced a bushfire of this magnitude before, I was filled with an almost unmanageable level of fear as to what was to come, what I was about to witness, and whether I would survive. With the fire several hundred meters from our home, a southerly change arrived, sparing our community but devastating those to the north of us. Before we had even caught our breath, bushfire-affected communities were experiencing another extreme event: the COVID-19 pandemic.

As a social scientist, I have observed many similarities between these two extreme events. Although they are clearly very different phenomena, they both serve to challenge how we see the world: what assumptions we make, what we take for granted, and how we behave. Here, I use my personal experiences to explore these phenomena and offer a research pathway to help us “make sense” of extreme events through an understanding of mental models. Sense making is an important element of planning for, and recovering from, extreme events and serves to improve the resilience of social-ecological systems.

How We “Experience” through Our Mental Models

Mental models are the lenses through which we experience a phenomenon. To illustrate, in the aftermath of the fires I was speaking with a friend. I explained to him that within my mental models I held an assumption that my government would provide me with a certain level of protection and security. Yet, when the fires reached our town, no one was here: no fire fighters, no aerial support, no police, no one telling us whether to stay and defend or to evacuate. The fires had extended beyond the government’s capacity to protect everyone. We had no power, no telecommunications, and no radio and so had no knowledge of what was taking place around us. I experienced loneliness and insecurity. My friend, who grew up in Africa, explained that in his mental models, he does not assume that the government will provide protection or security. As a result, he suggested that he would not have necessarily experienced the broader social-psychological effects of the fires in the same way as I did. His observation was useful in demonstrating that a person’s mental models will shape the nature of their experience.

A mental model is a metaphor that describes the small-scale model(s) that our minds use to explain how (a part of) the world works. These models, which can be elicited through a variety of methods, reveal how people organize and operate concepts cognitively. Mental models comprise two components. The first is a structure component, which includes a person’s knowledge, values, beliefs, and aspirations. The second is a process component, which is the operation of the model and explains how a person reasons, makes decisions, behaves, and filters and interprets information. Mental models are incomplete representations of “reality;” they are context dependent and can therefore change over time through learning and experience. What has been interesting to observe during both the bushfires and the COVID-19 pandemic is the extent to which a phenomenon can change our mental models to influence how we subsequently make decisions and behave.

How Experience Changes Our Mental Models

Phenomena of the magnitude of the Australian bushfires and the COVID-19 pandemic are seismic in their power to destabilize how those who experience them see the world. By way of example, our experiences of the fires were characterized by uncertainty (e.g., a lack of predictability of the fires and of communications), isolation (e.g., main access routes were closed for days, weeks, and even months), the unavailability and rationing of resources (e.g., food supplies, generators, battery-operated devices, and batteries), the maintenance of order by riot
police, a reduction and loss of business (particularly tourism trade), and a loss of important parts of our world (e.g., family and friends, homes, businesses, and ecosystems). Many people were in shock as to how quickly the world they knew could be transformed into something unrecognizable. These experiences, which many are facing with COVID-19, can cause us to question the assumptions of our mental models.

The assumptions within our mental models can appear extraordinarily fragile in the face of extreme events. For example, many people assumed that the spread of fires could be predicted with a sufficient degree of certainty, that fires could be brought under control through various management techniques, and that towns would be protected. The day before New Year’s Eve, for instance, many locals were discussing a fire-spread prediction map that did not have our town in either the fire or ember attack zone. As a result, many people did not make preparations for an imminent threat. The fires had been “around us” for months, so although people were aware of the location of the fire fronts, they were not necessarily preparing to come under immediate attack. A number of assumptions (e.g., that we can rely on prediction maps) were therefore challenged during the Australian bushfire season. The unprecedented fires, quite simply, were unpredictable and uncontrollable and could not be understood through the lens of existing assumptions despite the incredible efforts of the Rural Fire Service.

The importance of looking at assumptions relates to our expectations of how a system will respond to an event. The more incorrect our assumptions are, the less accurate our predictions and expectations of outcomes and, potentially, the more destabilising the experience will be. To illustrate, many people in fire-affected communities held certain assumptions about the function of their households, communities, and governments. The experience of the fires challenged those assumptions. For instance, many of us became aware of our vulnerability to a lack of predictability, our dependence on the viability of the road network, the weaknesses in the structure of our supply chains, and the fragility of peace and order—but also the immense power of social bonds. These experiences can transform our mental models with implications for how we behave.

Behavioral changes of people within bushfire-affected communities could be observed with the onset of the COVID-19 pandemic. After the New Year’s Eve fires that burned much, but not all, of our region, we continued to face the threat of fire until mid-February. During this time, many people were wracked with indecision and second guessed themselves (e.g., should I evacuate or not?); the immediate and confrontational nature of the experience left many feeling uncertain as to what was the best course of action. We were panicked. I have observed that these experiences have resulted in a change in how quickly it becomes possible to make decisions in the face of other extreme threats.

For example, although the Australian government initially recommended that children continue to attend school, many, including my partner and I, made the early decision to home school their children to reduce the risk of viral transmission (well before the NSW government eventually encouraged parents to keep their children at home). We acted swiftly and with conviction on the basis that the responsibility for our own health, and thereby the health of others, lay with us. We no longer depended on others to make those decisions for us. Certainly this decision was informed by the urgent warnings of Italian citizens; I got the sense that they, like me, had transformed mental models of (parts of) the world as a result of their experience with COVID-19. I interpreted their online warnings as a message: “Make no assumptions about the certainty and security of your world; do not assume that the world as you know it will be the world as it is.” In conversation with others in my community, we feel that transformations of our mental models as a result of the fires have somehow made us more prepared for the social-economic changes that have accompanied the COVID-19 pandemic.

**A Research Pathway to “Making Sense” of Extreme Events**

I would like to share some thoughts on a research pathway that could help with making sense of the extreme events that many have already experienced and that many more will come to experience in our climate-affected, globalized world (see Table 1). What this pathway offers is an opportunity to explore how our social systems respond to extreme events and, importantly, why. Such explorations can illuminate how people make decisions and behave and the consequences for their preparedness and resilience both individually and collectively.

First, we could seek to apply methodologies that have been designed to examine the lived experience, such as phenomenology. This methodology explores how a person “makes sense” of an experience. Importantly, the focus is on understanding the experience independently of existing knowledge, assumptions, or expectations, particularly those of the researcher. In other words, the researcher seeks to understand the phenomenon from the point of view of those who have experienced it by looking for patterns and relationships that reveal its unique meaning to the participants. This approach involves setting aside the existing systems that we have inherited and asks us to question what we have “taken for granted” about our social world through processes of reflection.

For example, I continue to re-live a distinct moment from New Year’s Eve: I looked at up at the black sky, felt the panic in the air, and thought, “I might die.” My hands were shaking, and I felt nauseous. I was experiencing the phenomenon immediately: nothing before or after really mattered in that moment. On reflection, that moment pointed to the illusory nature of the construct of “control.” I experienced a sense of futility—I had prepared our house and belongings, and yet we were surrounded by fire, and all escape routes were closed; we had no alternatives to choose among as we came under threat. I remember looking around and thinking, “How have I ended up in a position in which I have no control?” People who had escaped the fire front and were seeking refuge in our town provided harrowing accounts of what they had just seen—observing their helplessness and fear further eroded any sense of my own control. I was forced to question the extent of my ability to control anything in my world in that moment. This example seeks to demonstrate that phenomenological analysis not only describes our
forms of meaning but also provides opportunities to reinterpret them in ways that can be more complete, reimagined, or new entirely. The value of the methodology, then, is in creating the space for an honest and critical examination of our lived experiences and the implications for how we subsequently see, and behave in, the world.

Second, we could explore opportunities to apply methods that reveal how a person experiences a phenomenon on the basis of their pre-existing mental models. What is important to remember here is that the analysis is retrospective: “it is reflection on experience that is already passed or lived through.” Questions, therefore, need to account for the retrospective nature of the knowledge in exploring the mental models at the time of the experience (Table 1). A range of methods could be suitable in eliciting the mental models, including open or semi-structured interviews, walking interviews, and even focus groups. What this approach permits is an understanding of how and why an individual experienced a phenomenon in the way they did and how that experience might be different or similar to those of others.

Third, we could examine the suitability of methods to understand the effects of the experience of the phenomenon on a person’s mental models. The same methods described above could be used, but instead the questions should focus on the extent of change as a result of the experience (Table 1). We move, therefore, from understanding, exploring, and describing to a deeper interrogation of experience. This approach fits with the tradition of phenomenology, which has a “critical spirit” and seeks to discover new ways to construct understandings by assuming that the human world is not predetermined but rather open for discovery and the emergence of new significances. By extending our research to explore how people’s mental models shift and transform as a result of extreme events, we can support individuals and communities more effectively in their preparation and, crucially, their recovery.

What’s Next
Life is different on the “other side” of an extreme event. Certainly that has been my experience and appears also to be the narrative in the context of COVID-19: do not expect life to “return to normal” once the threat has diminished. It is critical that we understand not only what is objectively different (e.g., interest rates, business structures, and operations) but also what is subjectively different. How do people see themselves and the world differently in the aftermath of an extreme event, and what are the implications of these changes? Such understandings can reveal both the preparedness and the vulnerability within our communities to cope with extreme events in the future.

ACKNOWLEDGMENTS
Thank you to all the firefighters and support staff who assisted during the Australian fire season. Thank you to all who donated to and supported our communities. Thank you to my community, particularly T. Brewer, M. Foley, and J. Berry; to C. Bingham for the education; to my colleagues, particularly D. Blackman, C. Civilanovic, and D. Biggs; and to Molly and William for keeping me focused on what’s important.

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Table 1. Sample Interview Schedule for Understanding the Experience of a Phenomenon and Its Effects on a Person’s Mental Models

| Questions about the Phenomenon |
|--------------------------------|
| • Could you please describe your experience of the [x] phenomenon to me in your own words? |
| • How do you feel about this experience? |
| • How have you tried to make sense of your experience? |
| • Have you judged this experience? If so, how and what did that judgement reveal? |
| • Are there parts of the experience that you remember more than others? Are there parts that you re-live? Do you think you could provide an explanation as to why that might be? |
| • How have you spoken about this experience with others? |

| Questions about Pre-phenomenon Mental Models |
|---------------------------------------------|
| • Did you have any thoughts or knowledge about the phenomenon before you experienced it? |
| • What do you think the thoughts and knowledge were based upon, and where had they come from? |
| • What surprised you about your experience of the phenomenon, and why? |
| • What was unexpected, and why? |
| • Could you please describe some of the emotions you felt as a result of your experience? |
| • Did anything unsettle or upset you? If so, what? |
| • Do you think any of your assumptions about your world or situation were challenged as a result of your experience? |

| Questions about Post-phenomenon Mental Models |
|-----------------------------------------------|
| • If you were to experience the phenomenon again, what might you do differently? |
| • Is there anything that has changed in terms of your thinking about the phenomenon? |
| • Is there anything that has changed in terms of your behavior in response to the phenomenon? |
| • Do you see any parts of the world differently now? |
| • What advice might you give to someone else who might experience the phenomenon? |
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