CONFLICTING CUES WITH EMERGENCY WARNINGS IMPACTS PROTECTIVE ACTION

ABOUT THIS PROJECT

This project, *Effective risk and warning communication during natural hazards*, commenced in 2014 and adopts a multi-hazards approach to examine the effectiveness of response and recovery communication in communities affected by natural hazards. It applies well-established risk communications and psychological theory of human behaviour to determine whether existing emergency messages could be revised to improve comprehension. The project is part of the *Communication and warnings* cluster.

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SUMMARY

Australia's emergency services agencies face immense challenges when responding to natural hazards. Evacuating people in affected regions requires time, influence, coordination and expertise.

Triggering large-scale public evacuations in time-critical situations of flood or bushfire is problematic, as there is always some uncertainty about whether, or how, a natural hazard will occur. Compounding this problem is that emergency services are not the only

▲ Above: RESEARCH HAS SHOWN THAT ENVIRONMENTAL CUES, SUCH AS THE WEATHER OUTSIDE, INFLUENCE HOW INDIVIDUALS REACT TO WARNING MESSAGES. PHOTO: CFA

source of information that the public uses when considering taking action. There are also environmental cues, such as the weather outside, what is being said by the media, or what actions peers are taking, all of which can inhibit taking timely protective action.

When cues from different information sources are in conflict, such as when a flood evacuation warning has been issued but the weather conditions in the immediate area appears sunny and fine, it can cause uncertainty about the right action to take. Emergency service providers have suspected

that these conflicting cues exist (Bosschaart *et al.*, 2013; Gruntfest *et al.*, 1978; Lindell & Perry, 2004; Perry & Lindell 1990; and Yoo *et al.*, 2009) but this is the first research to offer empirical evidence of the impact of conflicting cues and how they influence public behaviour in Australia.

Results show that conflicting cues do exist and can affect information processing of risk perceptions, and therefore prevent appropriate protective action. The significant results were evenly spread across hazards, suggesting the problem is not unique to one hazard.

CONTEXT

This project responds to the concern that people do not always effectively act on official warnings about natural hazards. Conflicting cues are proposed to exacerbate the largely unintentional non-compliance with emergency warnings.

BACKGROUND

This project draws on two models to explain the effect of conflicting clues: the Risk Information Seeking and Processing model (Griffin *et al.*, 1999) and the Protective Action Decision model (Lindell & Perry, 2012).

The Risk Information Seeking and Processing model proposes seven factors that influence the extent to which people seek out information and the time they spend analysing it. These include individual characteristics, perceived hazard characteristics (i.e. risk perceptions),

▲ Above: THIS IS THE FIRST RESEARCH TO OFFER EMPIRICAL EVIDENCE OF THE IMPACT OF CONFLICTING CUES AND HOW THEY INFLUENCE PUBLIC BEHAVIOUR IN AUSTRALIA. PHOTO: SOUTH AUSTRALIA SES

affective response to the risk, social pressures to possess relevant information, information sufficiency, one's personal capacity to learn, and beliefs about the usefulness of information in various channels. The Risk Information Seeking and Processing model is built on the idea that just because information is available does not mean people will do anything to respond to it.

The Protective Action Decision model suggests that an individual's decision to engage in a protective action is informed by how they process socio-environmental cues alongside official communications. Environmental cues include smells and sights, while social cues incorporate behaviours of others. This can produce modelling behaviours, media coverage as a form of authority to effect behaviours, and information from unofficial sources as another behavioural influence.

Previous research indicates that many situational and individual factors will affect public behaviour in an emergency (Glick, 2007; Guion *et al.*, 2007; Mayhorn, 2005; Mileti, 1995 and Sharma & Patt, 2012) such as past experience with hazards, age, gender, language and country of birth.

BUSHFIRE AND NATURAL HAZARDS CRC RESEARCH

The project team surveyed 2,649 adults across all Australian states and territories about bushfires and floods. The respondents were randomly assigned to one of the 32 experimental conditions that presented them with an emergency warning

('**prepare to evacuate**' or '**evacuate now**') and either an environmental cue (i.e. a gif - an image file that supports both animated and static images - of a sunny day, bushfire or flood) or one of three social cues (i.e. a media article suggesting evacuating or staying, an organisation releasing an unofficial warning suggesting evacuating or staying, or observed behaviour of neighbours evacuating or staying).

Taking protective action in the event of bushfire or flood can mean any number of things, including preparing property and family for evacuation, calling for emergency assistance, or telling friends or family about the event.

The survey also collected information on past experience with hazards, age, gender, language and country of birth to see if these impacted the likelihood of taking protective action.

RESEARCH FINDINGS

This research has confirmed emergency services agencies' suspicions that conflicting cues can affect information processing of risk perceptions, and therefore prevent appropriate protective action. The significant results were evenly spread across hazards, suggesting the problem is not unique to one hazard.

CONSISTENT CUES

Consistent cues refer to when the instruction in the emergency warning was consistent with the environmental cue and social cues of media, a warning from an unofficial organisation, and peer behaviour.

When presented with consistent cues, participants were more likely to intend to evacuate, perceive risk about the event, share information with friends, family and peers, find emergency warnings to be effective, and comprehend the information.

Behavioural intentions to evacuate: participants were more likely to intend to evacuate under the '**bushfire, evacuate now**', condition when the emergency warning was consistent with a social cue from the media.

Sharing information with friends, family, and peers: information sharing was more likely for participants who received consistent environmental and media cues across '**flood, prepare to evacuate**' and '**bushfire, evacuate now**' warnings.

Risk perceptions about the flood/bushfire: perceived hazard characteristics were higher for participants when they received consistent instructions from emergency warnings, environmental cues and social cues of media and unofficial warning organisations, across bushfire and flood, and across both escalations of warnings.

Perceived effectiveness: perceived effectiveness has to do with how attention grabbing, powerfully informative, meaningful, and convincing the emergency warning was, and whether it was worth remembering. Participants perceived emergency warnings to be more effective when social cues from the media and unofficial warning organisations were consistent with emergency warnings for '**evacuate now**' messages across flood and bushfire.

Perceived comprehension: perceived comprehension has to do with how easy it was for participants to understand the message and comprehend the information in the message. Perceived comprehension was higher for participants who received a '**bushfire, evacuate now**' warning that was consistent with the social cue of an unofficial warning organisation.

Current information level: current information level refers to the participants present perceived knowledge of a hazard. Participants perceived they had a higher current information level when they received a '**flood, evacuate now**' emergency warning consistent with a social cue from an unofficial warning organisation.

CONFLICTING CUES

Conflicting cues refer to when the instruction in the warning message

conflicted with the environmental cue, and social cues of media, unofficial warning organisations, and peer behaviour. When faced with conflicting cues, participants were more likely to seek out additional information, whilst their information processing and self-efficacy were affected.

Seek out further information: information seeking refers to the participants' likelihood of searching for information about a hazard in order to understand it better, as opposed to tuning out when the topic of the hazard comes up. Participants were more likely to seek information when a '**bushfire, prepare to evacuate**' emergency warning conflicted with the social cue of an unofficial warning organisation. While seeking out additional information is sometimes encouraged and thus could be considered a protective action, it can result in milling behaviour, a communicative process whereby individuals come together in an attempt to define the situation, confirm the threat/risk,

and propose and adopt new behaviors, known as protective actions (Kuligowski & Dootson, 2018). Getting stuck in the milling process for extended periods of time can potentially place individuals in danger (Lindell & Perry 2004).

Process the information: heuristic information processing explains when individuals skim through information, do not spend much time thinking about the information, or believe they have been presented with far more information than they personally need about that topic. Heuristic information processing was higher for participants who received a '**flood, evacuate now**' warning that was consistent with the social cue of peers evacuating. Seemingly, the social cue was enough confirmation so they did not need to read more of the warning or seek further confirmation. Conversely, heuristic information processing was found to be higher for participants who received a '**flood,**

prepare to evacuate' emergency warning that was in conflict with the social cue of an unofficial warning organisation.

Ability to follow the instruction: self-efficacy has to do with a person's perceived ability to complete a task or engage in a specific action. Participants perceived their self-efficacy to be higher when the emergency warning was consistent with the social cue of peers performing evacuation actions in the bushfire context. Interestingly, participants perceived their self-efficacy to be higher when the '**bushfire, evacuate now**' emergency warning conflicted with the media social cue.

Of all the individual differences tested, gender was the only significant factor influencing protective behaviour. In other words, the results did not change when investigating different ages, language spoken at home, country of birth, or past experience with a hazard. The results did vary when splitting the data into

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SAMPLE WARNING USED IN THE RESEARCH EMERGENCY WARNING

Prepare to evacuate

People in Pebble Bay in the mid-north coastal region should prepare to evacuate due to flooding.

The Bureau of Meteorology has advised that a strong upper trough will move east into the mid-north coastal region today and then will move off the east coast tomorrow. A surface trough will deepen near Pebble Bay today, with a low pressure system most likely developing and slipping southwards over the mid-north coastal region this evening and tomorrow morning.

The heavy rain areas should contract southeast today, gradually clearing Longtime Bay tomorrow morning. The low will also most likely generate large swells as it slips southwards today and early tomorrow with dangerous surge developing about Matten Point and Longtime Bay beaches. Locally heavy falls are also expected today though are more likely to be associated with thunderstorms. Severe thunderstorm warnings will be issued as necessary.

You do not need to evacuate at this time but you should prepare to evacuate if the situation changes.

Consistent cue instructions (presented after the emergency warning message): You look outside the window and see it is raining.

Note: This stimulus has been changed and stylised graphics used for the purpose of this Hazard Note.

How to prepare for evacuation:

- Raise belongings by placing them on tables, beds and benches. Put electrical items on top. You may be able to place light items in the roof space
- Collect together medicines, personal and financial documents, mementos and photos
- If possible, check to see if your neighbours need help
- Make arrangements for care of pets and other animals, or take pets with you when you evacuate
- Collect together space clothing, medicines and personal hygiene supplies
- Find out where to turn off the electricity and gas
- Continue to listen to your local ABC radio station for updates

If you are prepared and wish to evacuate early, your safest option may be to visit family or friends who live away from the affected area. Alternatively, you may evacuate to a temporary evacuation centre that has been set up at Castooli Community Centre. Never drive, swim or walk through floodwater as it is dangerous and potentially toxic.

Conflicting cue instructions (presented after the emergency warning message): You look outside the window and see it is a sunny day.

male/female. This is contrary to most of the research findings from the emergency literature in the United States, which shows that individual differences play a role in impacting propensity to take protective action. Further exploration is required to understand this result.

HOW THE RESEARCH IS BEING USED

This study is part of a broader project being undertaken in four phases. The first phase – as summarised in this *Hazard Note* - sought to identify whether there is a conflict between emergency warnings and cues from the environment and other sources, such as the media, unofficial sources, and peer groups. The second phase will continue in 2019 and will develop and test an intervention to mitigate the negative effects of conflicting cues to improve protective action. Among other things, the intervention could include an acknowledgment of the potential existence of conflicting cues in official emergency warnings. It could also require emergency warnings to better convey a sense of urgency. The third and fourth phases of the project will attempt to translate these findings via briefings and workshops, and develop strategies with end-users to optimise emergency warnings and encourage community compliance.

FUTURE DIRECTIONS

Building on this project and previous research, future research will attempt to mitigate the issue of conflicting cues and find ways to translate these findings for the community. It is incredibly important for emergency services to provide communities with strategic information designed to instill specific preparation and response behaviours in order to save lives and properties and reduce harm.

FURTHER READING

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