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Passing crisis and emergency risk communications: The effects of communication channel, information type, and repetition

Judy Edworthy [a, *], Elizabeth Hellier [a], Lex Newbold [b], Kirsteen Titchener [c]

[a] Cognition Institute, University of Plymouth, Drake Circus, Plymouth, Devon, UK
[b] University of Exeter, Exeter, Devon, UK
[c] Plymouth, Devon, UK

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ABSTRACT

Three experiments explore several factors which influence information transmission when warning messages are passed from person to person. In Experiment 1, messages were passed down chains of participants using five different modes of communication. Written communication channels resulted in more accurate message transmission than verbal. In addition, some elements of the message endured further down the chain than others. Experiment 2 largely replicated these effects and also demonstrated that simple repetition of a message eliminated differences between written and spoken communication. In a final field experiment, chains of participants passed information however they wanted to, with the proviso that half of the chains could not use telephones. Here, the lack of ability to use a telephone did not affect accuracy, but did slow down the speed of transmission from the recipient of the message to the last person in the chain. Implications of the findings for crisis and emergency risk communication are discussed.

Behavior in response to civil emergencies is a topic of considerable concern. Across the world people are vulnerable to risks ranging from naturally occurring events such as earthquakes, extreme weather conditions, and tsunamis, to industrial and other accidents, and of course terrorist attacks. Responding to such emergencies is a topic of significant concern and investment from governments, who are increasingly involving psychologists, human factors and other experts, and knowledge of human behavior in their preparedness plans. There are many important areas of research that are relevant, such as people's understanding of risks, for example their willingness and ability to respond to an emergency; their trust in different sources of information; and the way the information spreads through a community. Much of the direct and indirect research that is relevant here has been distilled into broad-ranging guidance and reviews for policy makers and other stakeholders in emergency preparedness and is embodied in the emergent field of Crisis and Emergency Risk Communication (CERC, e.g. Sorensen, 2000; Reynolds and Seeger 2005;Seeger, 2006; Reynolds, 2002; Wood et al. 2008; Centers for Disease Control and Prevention (CDCP), 2012).

The Crisis and Emergency Risk Communication model is intended as a tool to assist in the management of civil emergencies across the whole range of activities. Reynolds and Seeger (2005) present the working model of CERC as consisting of five main stages: pre-crisis; initial event; maintenance; resolution; and evaluation. All of those aspects of human behavior listed above, and many others, are relevant at various points in the model. In this study we are concerned with behavior which is relevant to specific aspects of CERC at the precrisis and initial event stages - the development of messages and the understanding of channels and methods of communication (Reynolds and Seeger, 2005).

One important aspect of the initial stages of an emergency is that emergency messages will be sent out from central sources (probably multiple sources, in a variety of formats) and will be passed on from person to person. In the three studies reported here we simulate this process. Specifically, we investigate the relationship between the mode of message transmission (the communication channel), the accuracy of transmission of the elements of messages down a chain of receivers, the effect of repeating and/or enhancing the messages and (in the final study), the speed and accuracy of transmission of messages in a more realistic setting where some channels might be unavailable.

* Corresponding author.
E-mail address: jedworthy@plymouth.ac.uk (J. Edworthy).

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Research which has investigated the transmission of information from one person to another demonstrates, not surprisingly, that information degrades as it is passed from person to person. Information that might be initially quite detailed tends to be reduced quite quickly to a few key facts (Allport and Postman, 1947). Though there is initial degradation, beyond four or five people messages tend not to degrade further (Dalrymple, 1978). Research has little to say about the relative survival of different elements of crisis messages under controlled conditions when passed from person to person, but is informed by research both on warning message design and studies which have looked post-hoc at real emergencies.

Because message information will inevitably be lost during transmission, it is important that they are designed in such a way as to be maximally efficient, especially if they are transmitted via a medium which restricts the size of the message (such as Twitter). In essence the accepted guidance is that a message should have everything in it that the receiver needs, and nothing that he or she does not, stated clearly and unambiguously. The CDC (2012) has proposed 'Who, What, Where, When, Why and How' as representing the essential components of a crisis communication. Similarly, Mileti and Sorensen (1990) propose that specific pieces of information in warning messages should include the hazard, the location, the time of the incident, and guidance. Reynolds and Seeger (2005) suggest that there are clear distinctions between more general risk communications and crisis communications, but warnings are more broadly recommended to have four main components: a signal word (e.g. 'Danger'), a statement of the hazard, a statement of the consequences of exposure and instructions on how to avoid the hazard. These are designated in ANSI standard Z.535 (1987). We therefore based the messages we tested on the collective guidance above.

Though the research literature has little to say about the relative survival of the individual elements of messages as it passes down chains of people under controlled conditions, studies which have looked post-hoc at the way information is disseminated under real crises can inform this topic (Sutton et al., 2014; Butts et al., 2007; Chew and Eysenbach, 2010). For example, Sutton et al. (2014) looked at the pattern of tweeting and retweeting messages during a 48-h period during a canyon fire in 2012. They also carried out a content analysis of the tweets and found that the messages most likely to be retweeted were not only more likely to be hazard-related, but were more likely to concern hazard impact and to be advisory in nature. Thus this data suggests that key elements 'survive' in terms of their likelihood of being passed on through retweeting. Whether or not those elements survive when they are passed from person to person is one of the main focuses of the studies presented here.

As well the transmission of information from one person to another and the relative survival of message elements down those chains, we are interested in how both of those factors might be affected by the mode of transmission of the message. In the first two studies we ask participants to pass messages down chains by means of speaking, writing, email, SMS text messaging or telephone. The most obvious dichotomy here is that some of these modes are primarily auditory, while the others are primarily visual. Studies comparing visual and auditory materials in applied settings have demonstrated mixed effects. Conway and Christiansen (2005) showed that auditory stimuli displayed a learning advantage over visual stimuli, and Wogalter and Young (1991) found that auditory warning messages were more readily complied with than visual ones. This study also showed that presenting a warning in both visual and auditory modalities outperformed the individual modalities, as did Cao et al. (2010). In terms of direct memory effects, Furnham et al. (1990) found that printed factual information was better remembered than an audio-visual or audio presentation, whereas Corston and Colman (1997) found that audio and print forms of communicating warnings increased recall relative to video format.

Obviously there are clear stimulus differences between written and spoken communications which might underpin any observed differences between them, such as the relative permanence of a written stimulus, which can be re-examined at will, compared with the typically fleeting nature of a spoken message. However, with modern communication methods the distinction between auditorily-presented information (such as speech) and visually presented information (such as an SMS message) is rather more blurred. Biber (1991) points out that speech and writing are not bimodal, but instead vary along a number of dimensions such as interactive vs edited, and reported vs immediate. These dimensions appear to vary across different styles of communication which ostensibly use the same mode. For example, as Herring points out (2010) many authors have suggested that computer-mediated communication, especially messaging, is more like conversation than written communication, though it has the property of permanence. This is likely to be true also of SMS messaging. Also, people are more likely to exhibit certain types of behavior in some modes than in others – for example, Whitty et al. (2012) demonstrated that people are more likely to lie spontaneously on the telephone, but to tell planned lies via SMS. Thus we do not necessarily expect all versions of a single mode (primarily auditory or primarily visual) to demonstrate the same characteristics. For example, messages may not be transmitted the same way when written down on paper than when passed on via SMS. In the studies that follow we attempt to control for the most obvious and potentially confounding factors across the modes tested, but our key aim is to provide a fair test of the differences when the modes function in the way they typically would do in reality.

In the first experiment, five communication channels are used. These are SMS text, email, paper, face-to-face, and telephone. They are compared by passing a set of messages down a chain of respondents under laboratory conditions. In the second laboratory study, messages are presented either by telephone or are written, with and without repetition, with some participants being given instructions either to re-read and check what they have written or to ask questions in order to reduce the a priori advantages that one or other communication might possess over the other. In the final field experiment, participants received one of two types of auditory message and were asked to pass it on. In some cases they were allowed to use whatever means they preferred to communicate the message down the chain, and in others they were restricted from using the telephone, as they might be in a real civil emergency.

1. Experiment 1

The aim of this experiment was to explore both the effect of communication channel on the transmission of information through chains of participants and the relative persistence of the various message elements down the chain. Five communication channels were compared - two primarily auditory (face-to-face and cellphone) and three primarily written (SMS text message, email, and paper). These channels were selected to best represent the communication options available in emergency incidents. We used chains of ten people as this represents a long chain (for example, Dalrymple (1978) found that natural message chains seemed to consist of eight or fewer people). If there is to be breakdown of information, we would expect this to have happened before the information has reached the end of the chain.