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**Call #:** Q223 .C6555 2013  
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**Lending String:** *ALM, ALM, BXM, ILU, KNM**

**Patron:** Sydoriak, Stacia

**Journal Title:** Communication and engagement with science and technology; issues and dilemmas; a reader in science communication /

**Volume: Issue:**  
**Month/Year:** Pages: unsure A3 - 129

**Article Author:** Trumbo, Craig W

**Article Title:** Communicating the Significance of Risk

**ILLiad TN:** 418083

**ILL Number:** 108311410

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COMMUNICATING THE SIGNIFICANCE OF RISK

Craig Trumbo

Introduction
Risk is one of the most dynamic and potentially charged aspects of scientific and technical communication. Issues of risk arising from science and technology capture the attention of the public, of policymakers, and of the media in such a manner as to often take on a life of their own. As a result, scientists and professional science communicators are sometimes stymied in their efforts to appropriately communicate risk. It is therefore important that science communicators have a good understanding of how people perceive risk, as well as how best to communicate it.

In perhaps its simplest definition, risk can be seen as a tripartite concept: the probability of harm occurring due to some hazard. The components of this definition bear additional consideration.

Probability is perhaps the most difficult element of risk for many people to understand. In risk circumstances the expression of probability often becomes statistical because certain parameters (e.g., actual disease rates) are not known, making inference and estimation necessary. The probability of being affected by a risk is therefore some estimated value within some estimated range of error.

In addition to this complication, estimated probabilities are somewhat interchangeably expressed in terms of absolute and relative values. This is especially acute in medical studies when a report states that there is some percentage increase due to an exposure. The percentage may be large, say 15% but this is the increase over what may actually be a very small absolute chance, say 0.01%. Small absolute risk values are also difficult, with the estimated probability of harm from exposures often being in the neighbourhood of one in a million, for example.
Likewise, the idea of harm is complicated. To a large extent this is also due to the fact that actual harm must be estimated. On one end of the spectrum, of course, there is the harm of immediate death, say, in the catastrophic failure of a space vehicle launch. In such extreme circumstances death is assured. In the case of the US Space Shuttle program, some estimates of catastrophic failure on launch were 1 in 60 (Martz & Zimmer, 1992). So that was the chance of death. But rarely is it so cut and dried. Harm is much more typically something that does not occur immediately. For example, a good many risks involve the possible development of some form of cancer. Cancer can take many years to appear, even in cases of acute exposures. Further, concrete proof that some exposure eventually leads to development of cancer in a specific individual is very rare, owing to our incomplete understanding of the disease and its multiple causes.

Finally, the dizzying array of hazards in the modern world hardly simplifies things. Early work on risk perception by Paul Slovic and colleagues (discussed in more detail below) delineated the way in which people differentiated a variety of risks, ranging from the commonplace (e.g., swimming pools) to the highly unlikely (e.g., a nuclear exchange). In this series of studies, nearly 100 specific hazards were compared. Yet 100 hazards is just the tip of the iceberg, and new items are added daily. Hazards may be grossly categorized by ideas such as natural vs. human-made, those affecting individuals vs. large populations, those with immediate effects vs. those with long-term consequences, and so forth. In many cases, however, the true nature of a hazard can be obscured by such classification. For example, the Hurricane Katrina disaster in New Orleans is variously understood as a natural disaster (the hurricane) or as a human-caused disaster (the engineering failure of the levees). In fact, a good many large-scale disasters are such combinations (the Fukushima Daiichi nuclear disaster certainly qualifies), and are coming to be known as “natech” disasters (Picou, 2009). The time-horizon problem with hazards is also a significantly complicating problem. At least in the US, while the political controversy involving climate change is shaped by many factors, the slow-motion nature of clearly identifiable effects thwarts any sense of urgency on the part of the public or elected officials. Such hazards are coming to be called slow-motion disasters (Cline, et al., 2010).

So while the initial definition of risk offered here is at least superficially straightforward, any casual scan of the current landscape makes it immediately obvious that there are complicated processes involved. One process that significantly complicates the manner in which we face risk is the nature of human perception and judgment.

**Perspectives on Risk Perception**

Risk has for some time been approached from one of three competing scholarly perspectives: cultural, sociological, and psychological. The main thrust of this chapter is to explore the psychological perspective because this perspective has
been to a fair degree most influential in shaping both the research and the practice of risk communication.

Before considering the more psychologically-based aspects of risk, it is important to also emphasize that risk exists in cultural and social dimensions (Kahan, Jenkins-Smith & Braman, 2010; Zinn, 2008). In terms of culture, consider that all three components of the risk definition above are present in some form regardless of, for example, a nation’s technological development (even on the end of the spectrum represented by contemporary agrarian or nomadic peoples). The earliest work by Douglas and Wildavsky on risk and culture was based on the idea that the perception that people have of risks is shaped, or actually constrained, by such factors as the degree to which a culture is collective versus individualistic in its outlook, or strongly stratified socially versus more egalitarian (Douglas & Wildavsky, 1980). Daniel Kahan and colleagues, who are working with the concept of Cultural Cognition, are undertaking some of the most current work on culture and risk. Their work is built upon the work of Douglas, asserting that the core values held by individuals interact with the various mechanisms of psychological risk perception (more below). Policy preferences to address risk are shaped in the light of their cultural orientation toward the specific issue (Kahan, 2011; Kahan & Braman, 2006; Kahan, Jenkins-Smith & Braman, 2010).

The Sociocultural perspective on risk has also offered important insights. Regardless of its positive or negative connotations, risk can be seen as a condition of modern society (or modernity). Giddens (1998) describes modernity as “a society—more technically, a complex of institutions—which, unlike any preceding culture, lives in the future, rather than the past” (p. 94). The very notion that we can consider what is and is not risky, and make individual and societal choices, is certainly new. The array of factors that must be considered today is, however, greater by orders of magnitude than in most of human history.

In his work *Against the Gods*, Peter Bernstein describes the mastery of risk as the vehicle that propelled society into modernity:

*The ability to define what may happen in the future and to choose among alternatives lies at the heart of contemporary societies. Risk management guides us over a vast range of decision-making, from allocating wealth to safeguarding public health, from waging war to planning a family, from paying insurance premiums to wearing a seatbelt, from planting corn to marketing cornflakes.*

*(Bernstein, 1996)*

In a somewhat less utopian vision, sociologist Ulrich Beck describes this condition as the “risk society,” in which “dangers are being produced by industry, externalized by economies, individualized by the legal system, legitimized by natural sciences, and made to appear harmless by politics” (Beck, 1992).
In terms of the human processes of society, risk has long been an element affecting differentiation in social class and human health. For example, the phenomenon of environmental racism is driven by the class-based assignment of environmental hazards, which has the additional consequence of permitting such hazards to perpetuate.

Of the perspectives that tell us about people’s reaction to risk information, perhaps most prominently there are studies that examine the various psychological mechanisms behind the perception of risk. These are very relevant to understanding the processes of risk communication and how audiences process and understand risk messages.

The Sociological perspective has also been most adept at providing insight into the actions of industries and governments with respect to the technological hazards they create and oversee. A central concept in this area of work is William Freudenburg’s “atrophy of vigilance” (Freudenburg, 1992). In this process, the institutional entities responsible for maintaining safety (e.g., the Nuclear Regulatory Commission in the US) enjoy a prolonged period of safety during which atrophy in oversight occurs. This slippage might be associated with technological development or a false sense of security having lead to unofficial relaxation of safety practices (i.e., cutting corners). Then, of course, a major incident occurs. This perspective has been applied to a range of disasters, most notably by Freudenburg to the oil industry disasters in the Gulf of Mexico (Freudenburg & Gramling, 2010).

While the Cultural and Sociological perspectives on risk are rich and offer key insights, the psychologically-based scholarship has been arguably more influential in shaping the practice of risk communication. A sizable volume of research has been compiled focusing on psychological risk perception over the past three decades. But what do we mean by “perception”? Early in the recent growth of this work, the US National Research Council compiled a review of risk communication that included a careful consideration of the term “perception”. The report argues that risk perception “is more accurately described as the study of human values regarding attributes of hazards (and benefits)” (NRC 1989, p. 53). The critical point made in this understanding is that, in the process of perception, individuals weigh the perceived risks and benefits, whether they are real or imagined. It might be argued that the term perception itself is not optimal, and that judgment would be better (Dunwoody & Neuwirth, 1991), although perception remains dominant in the literature.

For risk communicators, there are two very important perspectives that need to be kept in mind. These perspectives are informed by what has become known as the “psychometric model” of risk perception, and a body of research that examines a phenomenon known as “optimistic bias.” These perspectives tell us a great deal about how individuals tend to orient toward risk and risk communications. We can turn to that material here, as informed by previous reviews of the literature (Trumbo, 2002).
To investigate risk perception, researchers surveyed various groups and asked them to respond to a series of nine questions concerning 30 common hazards (Fischhoff, Slovic, Lichtenstein, Read & Combs, 1978). The hazards ran the gamut from the common but fairly dangerous (skiing, swimming pools, auto accidents) to the very uncommon but potentially catastrophic (nerve gas accidents, train derailments). By looking at aspects such as how well a risk is understood, or how much control an individual has over a risk, the researchers used statistical techniques to develop a model showing that reactions to risk can be characterized most compactly in two dimensions—or in a “risk space.”

One dimension of risk space is termed dread. This is related to the scale of the risk and the degree to which it harms innocent individuals. Nerve gas accidents and nuclear war have high dread while aspirin and swimming pools do not. The second dimension, termed knowledge, involves how well a risk is understood and how observable its consequences are. On one end of this spectrum are things like electric fields and PCBs, on the other end are automobile accidents. These processes are driven, to some degree, by the availability heuristic, which describes how people ascribe a greater chance of harm to the more vivid and thus memorable hazards they know of, or are informed of, via mechanisms such as the news media. This is why, for example, people often over-estimate deaths in airplane accidents relative to automobile accidents. Taken together, looking at risks in these terms can predict how people will react. Risks that evoke dread, whether they are associated with common or rare hazards, motivate people strongly toward action. Ironically, some of the most common hazards that cause a great number of injuries or deaths, but which do not evoke dread, are commonly tolerated (Morgan, 1993).

This line of investigation has been robust. The two-dimensional model has since been widely replicated and tested in a variety of countries (Slovic, 2000). Others have also expanded risk space into three dimensions using a wide variety of attributes such as the number of people affected or the voluntariness of the risk (Kraus & Slovic, 1988; Morgan, et al., 1985; Mallett, Duquesnay, Raiff, Fahrasmane & Namur 1993; Slovic, Fischhoff & Lichtenstein 1985).

More recent survey work with the model has addressed the question of how it works with single hazards encountered in “real life,” as opposed to the abstract hazards used in the early studies. The early work with the psychometric model wasn’t designed to shed light directly on the differences between individuals. The more recent work has done just that, providing a parallel examination of how people differ in their reaction to individual hazards. Many of the same principles apply. However, since human personality and cognitive traits are complex, the amount of explanation provided by these “individual difference” models is somewhat limited. But overall, this work has shown that the psychometric model functions well to describe how individuals react to single, real hazards, and has also provided a reliable set of survey questions for the measurement of this construct (Trumbo, 1999; Trumbo, 1996).
An important perspective in social psychology holds that people process information through two unique mechanisms, cognitive and affective. In an extension of the individual-level approach, Slovic and colleagues have been further exploring the role of emotions, or affect (Slovic, 2010; Slovic, Finucane, Peters & MacGregor, 2004). In this work, individuals are described as possessing an “affect pool,” in which images of the world held by the individual, including its hazards, are tagged with emotional markers. As people make judgments, they call on this pool, just as they rely on other mental shortcuts such as how imaginable the risk is, or how similar it is to something else known or experienced. These “dual process” theories have been used to shed some light on individuals' risk perceptions (Slovic, 2010).

**Optimistic Bias**

While the psychometric model provides insight into the manner in which individuals perceive various hazards as risks—and especially how they react to some hazards versus others—a parallel line of investigation has shown that people are also influenced by a related but unique tendency that has a subtle influence over their orientation toward all hazards and risks. This tendency has become known as “optimistic bias.”

In general terms, optimistic bias (or in some circles comparative optimism) is the phenomenon in which individuals see themselves—in comparison to others—as less likely to be harmed by events in the future, or see themselves as being more likely to achieve some goal or status (Burger & Palmer, 1992; Weinstein, 1989). Optimistic bias has been observed in a wide variety of contexts, including risk-taking behaviors such as motorcycle riding, bungee jumping, and smoking (Middleton, Harris & Surman, 1996; Rutter, Quine & Albery, 1998; Weinstein, Marcus & Moser, 2005) and vulnerability to health hazards such as radon (Weinstein, Sandman & Roberts, 1990). Optimistic bias can be strongest in the context of hazards that are infrequently experienced on a personal basis, such as hurricanes (Weinstein, Lyon, Rothman & Cuite, 2000).

A range of circumstances can affect optimistic bias. One does stand out, however. That is the amount of time that has passed since the particular hazard has appeared. An example will help clarify. In work conducted recently by the author, a survey was conducted of US residents living near the coast along the Gulf of Mexico. The survey was conducted in January 2006 immediately in the wake of Hurricane Katrina (Trumbo, Lueck, Marlatt & Peek, 2011; Trumbo, et al., 2010). The purpose of the study was to assess the degree to which physical distance from New Orleans might affect individuals’ outlook, or risk perception, for the next hurricane season. While distance turned out to not be a very strong predictor of hurricane risk perception, the study did set the stage for a subsequent survey.
Two years later, there had not been a single hurricane affecting the US Gulf Coast. In January of 2008 the same questionnaire was given to the same individuals in the interest of seeing if their perception of hurricane risk changed over time, following the hypothesis that the two years of quiescence would yield a drop in concern. In addition to a set of questions measuring risk perception, the two surveys also had a pair of questions comparing how individuals viewed their own risk versus the risk of others. This is an indicator of their optimistic bias concerning hurricanes.

Over the two years, these Gulf Coast residents did in fact become markedly less concerned about hurricane risk. Their level of optimistic bias also shifted, with an interesting pattern showing that their assessment of self-risk was lowered along with their assessment of risk to others. The difference between the two remained equal, however. This study therefore illustrates not only the phenomenon of optimistic bias, but also its dynamic, as well as static, nature with respect to changes over time.

**Review of Important Factors**

Taken together, these perspectives and others have provided researchers and communicators with a broad understanding of the manner in which people tend to evaluate risk information in a biased fashion. Anderson and Spitzberg (2009) provide a summary of these biases and describe how reactions to risk are heightened by a host of factors. Perception of risk is heightened:

- when the hazard is not voluntarily accepted by the individual or is viewed as uncontrollable or irreversible (e.g., groundwater contamination of wells);
- when the form of harm is easy to imagine (such as physical injury), rather than vague or indirect (long-term disease development);
- when the sheer number of people that might potentially be affected is great, such as in a widespread natural disaster;
- when the hazard involved is new or not easily understood (cell phone radiation)—or complex such as the Fukushima Daiichi nuclear disaster;
- when the hazard is nearby (e.g., a hazardous waste incinerator), although this factor can be complicated in the case of ongoing rather than rapid onset hazards that have an economic advantage (for example, individuals who work at a hazardous location may develop tolerance);
- when the hazard poses risk to children (either real, as in car seats, or imagined, as in vaccinations);
- when the risk associated with a hazard is viewed, for any number of reasons, as morally objectionable or fundamentally unfair to those affected, as in the case of terrorism.

Of central concern to risk communicators is that the perception of risk is heightened:
• when the source of risk information is not trusted or, especially, was once trusted but now is not (industry and government face this problem often);
• and when the risk is strongly emphasized in the news media or in other forms of public communication such as social media (the iodine rush on the US west coast following the Fukushima Daiichi nuclear disaster, for example).

It is common to refer to these processes as biasing, which implies that the resulting perceptions are wrong. That was the dominant point of view in the world of risk research and practice for some time. More recently, however, it has come to be recognized that individual and social reactions to risk are based strongly in the values and cultural orientations held by people, which are not easily labelled as right or wrong. For example, parents who resist vaccination for their children over concerns about autism do so in the face of an enormous volume of medical research showing vaccination to be safe, while they also potentially cause harm to public health by not vaccinating their children. But their concern is grounded in a belief that no degree of risk is acceptable in this particular circumstance. In one light, it is easy to label their actions as illogical. In another light, it is difficult to impose a level of acceptable risk on parents concerning their own children—should they be expected to accept one chance in a thousand? One in ten thousand? This particular scenario also highlights the distinction between an individualist versus collectivist cultural orientation. Should one accept individual risk for the greater good of public health?

The complicated manner in which these risk perception factors can intermix is perhaps best illustrated through an example (Trumbo & McComas, 2003; Trumbo, McComas & Besley, 2008). A series of studies of risk perception and information processing was conducted in the context of community cancer concerns. In these cases, concerns are raised by individuals who live in communities where there is a hazard that is thought by some to be associated with a suspected increase in the area's cancer rate. These cases are fairly common in the US, with perhaps as many as 1,200 formal complaints registered annually (Trumbo, 2000). State health agencies respond to these concerns in a variety of ways, ranging from careful multi-year investigations to quick dismissal (Greenberg & Wartenberg, 1991). Even when a case is investigated carefully (about a third are), very few provide any scientific evidence of elevated cancer rates, and virtually none ever provide scientific evidence of a link between cancers and environmental causes (Kase, 1996).

In terms of the definition of risk, these cases involve probability. The epidemiological studies done in these cases often involve small sample sizes (there are few cases of disease or death) that must be analyzed within some geographical boundary determined by the researchers. This leads to a wide margin of error in estimates of cancer rates. The often non-significant findings of epidemiologists are commonly unacceptable to members of the public who are more motivated by emotional factors and disinclined to accept any risk. The situation is further complicated when industries and governments become involved, as readily happens in cases of cancers associated with mining or gas extraction, nuclear accidents, and other transboundary accidents suspected to have caused cancerous effects. Indicators of risk are thus not so easily identified through conventional means.
situations is further complicated because science does not at present have good tools to link an individuals’ cancer to an environmental exposure that may or may not have occurred, at an unknown dose, perhaps a number of years before.

Over the course of this research project, some 35 different cases were investigated using survey methods. The hazards included leaking underground gasoline tanks affecting a very small area, high voltage transmission lines and transformer stations, agricultural chemicals (including those used on golf courses) suspected of entering groundwater, nuclear facilities, a variety of incinerators, military bases, and large-scale industrial chemical complexes. Individuals were asked, for example, whether they had strong emotional reactions to the hazard (fear, anxiety), and they were asked about the manner in which they viewed the hazard cognitively (does the hazard affect many? Is it controllable?).

The common thread among these cases is the harm involved. In each case some form of cancer was suspected to be linked to exposures from the hazards involved. The types of cancers did vary. Leukaemia dominated and presented a number of cases in which there had been childhood deaths. Rare brain cancers were also involved in a number of cases. Breast cancer was also a prominent concern. Regardless of the type of cancer, this type of harm is one that is strongly feared, as it often involves very difficult treatment regimens with the definite prospect of a shortened life or near-term death.

This particular set of studies also serves well to illustrate many of the points made above with respect to the factors that increase risk concerns. Individuals do not voluntarily expose themselves to these hazards, and the effects are seen as uncontrollable and irreversible. Because cancer is involved, the harm is vividly imaginable (Trumbo, et al., 2008). Often the geography of exposure is extensive, affecting a large number of people. The hazards and harms are difficult to understand and are complex. These cases always involve a hazard that is located in near proximity to the people affected. In many cases the harm is most prominent in children, and in all cases the exposure to children is an elevated concern. Often the risk is viewed as unfair or morally objectionable due to the much greater likelihood of toxic emissions to be located in areas of lower wealth and political power.

Of most concern to risk communication, these cases almost always exist in a strongly adversarial framework that pits community activists against an industry or government agency, with the health department often caught in the middle. Trust is a major issue, especially as there usually exists a strong difference between communities and industry in terms of previous experience with such cases and resources to leverage the controversy with regulators and the legal system. Finally, these cases always create significant attention in the news media and through channels of online social networking.

What the studies consistently found—across communities, hazards, and harms—was that the dual-process psychometric model does describe the manner in which individuals viewed risk in these cases. There were strong expressions
of both cognitive and affective elements in risk judgments, with those employing cognitive strategies on average indicating greater levels of concern compared to those employing affective strategies. Further, individuals who more strongly used systematic approaches to information processing were more likely to link that with a cognitive basis for risk perception and greater concern, and those using heuristic processing more likely to link to affective perception and lower concern.

One of the unexpected and interesting findings was that careful processing of information and more deliberate cognitive perception increased concern over the hazards. For a good many years the dominant perspective in risk communication was that heightened concern, especially in the absence of hard scientific evidence, could be countered by simply getting people the facts and showing them how to objectively process them, and that emotional factors were responsible for “irrational overreactions” to hazards. At least in these cases, those who were dismissing the hazards as not risky were doing so based on, perhaps, “irrational under reactions.”

What this case study description shows in terms of risk communication is the significance and complexity that is faced by the professionals doing the communicating. The form of the risk is very complicated, the information environment is complicated and difficult to manage, trust is absent, making effective messages very difficult, and people process messages and make decisions in ways that may seem counter-intuitive to the scientist.

Fortunately, there are ways to successfully communicate risk information.

**Approaches to Communicating Risk Information**

The now expansive literature on risk communication provides several overarching general principles that have as their foundation the best practices in many domains of communication (Lundgren & McMakin, 2009; Sellnow, Ulmer, Seeger & Littlefield, 2010).

An appropriate place to start such an examination of broad principles is with an established perspective on a definition for risk communication. Because risk communication involves a wide variety of approaches and applications, it must be seen as a multidimensional construct. Krinsky and Plough (1989) provide that there are five dimensions to the concept. First, the nature of the intentions behind the risk message must be considered. Messages can be essentially without goals or can have high expectations for specific outcomes. Second, the content of the risk message is highly variable, running from the more narrow focus of health and environmental messages to wide-ranging social concerns. Third, the audience for which the message is intended must also be considered: sometimes targeted, sometimes not.

A fourth dimension of risk communication involves the source of the information. Frequently this involves scientists and other technical experts, but it can also include a much broader range of sources involving the media and citizen groups, which should be considered as communication channels, or can be considered active in risk communication. As researchers have identified additional ways to face risk communication challenges, there are additional ways to make a concerted effort to improve the information that reaches the audience. As with any type of communication, risk becomes important in understanding how information is received.

One of the most pressing challenges is to improve the credibility (McAfee, 2010). Credibility can be threatened by inconsistent and inaccurate information. The messenger has a great deal to do with how the public views the legitimacy of the information.

A consistent theme is the need for the public to have access to information that is not only reliable but also scientifically sound. The vast majority of work on risk communication has focused on communicating with the public directly. However, the role of the media, especially as a source of information, is becoming more important, especially as the public becomes more diverse across racial/ethnic lines.

Risk communication has developed a number of tools in recent years (Hoff, 2002; Fishbein, 1980). First, detailed risk information should be available to the public. If risks falls into the category of over-the-counter drugs, even though the risk is real, the message people might get is that they are not the right things they should be using. The message is that they should be using something else, but the message is not communicated in a way that is clear, or that is consistent with the scientific evidence. This is where the role of the media becomes important. The media can help to clarify the message and ensure that people understand the implications of the risk information they have received.
citizen groups, for example. Finally, the manner in which the message travels should be considered. Risk messages can be delivered through very restricted channels, or can flow freely through society.

As researchers have considered the intricacies of risk communication they have identified a number of general tasks, difficulties, and paradoxes that tend to face risk communicators. Fisher (1991) identifies three varieties of challenges. First, the risk communicator must clearly define the objective of the communication, embrace the importance of message evaluation, and realize that no communication effort is ever completely effective. Then, it is critical to make a concerted effort to make the science of the risk assessment accessible to the audience. And finally, the perspective of the audience must be considered and entered into the whole risk equation because public reaction invariably becomes intertwined with the risk condition itself.

One of the most important tasks of the risk communicator is to establish credibility (McComas & Trumbo, 2001; Trumbo & McComas, 2003). Credibility can be hurt when the audience perceives the message to be inconsistent with the facts or inconsistent with previous messages, when the message has a reputation for deceit, or when the expert sources appear incompetent or in disagreement. The audience's evaluation of the overall legitimacy of the risk issue also influences credibility.

A consistently difficult task for risk communication involves getting the public’s attention. Researchers have found that the individuals who need risk information the most are also often the ones who are least likely to attend to the risk message. Community involvement can be visualized as a pyramid, with the vast majority of individuals being for the most part uninvolved and uninterested (NRC, 1989). Communicators must pay close attention to their choice of communication medium. This almost invariably includes working with the news media. As in any domain, it is important to define the audience carefully in terms of its receptivity to the communication, ability to process the information, and capacity to act on the recommended behaviors. Understanding the audience in terms of demographic characteristics is equally important; especially as risk messages can be differentially understood across age, sex, and racial/ethnic contrasts (Finucane, Slovic, Mertz, Flynn & Satterfield, 2000).

Risk communicators have considered a body of experiences and have developed a “conventional wisdom” approach to risk communication. Johnson and Fisher (1989) identified five items held up to their scientific evaluation. First, details matter, and what may seem like minor differences in the way information is expressed can have a big impact on people’s reaction. Comparing risks falls into this domain, for example, comparing a cancer risk against a year of dental x-rays versus eating peanut butter may generate very different reactions, even though the comparisons are technically equivalent. The way that a risk message personalizes the risk has an influence. People react most strongly toward things they can imagine as relevant to themselves. The limitations created by virtue of educational experience affect people’s ability to access and process
information. This in turn has a strong influence over their reaction to technical information. Information that can't be understood is often less trusted. Dramatic hazards and events are typically reacted to more strongly, especially when they are communicated in a graphic way. And finally, people will take risk information and generalize it, sometime inappropriately, to other hazards that they may perceive as being related.

Best Practices

Risk messages should be crafted to address the following seven elements, which are gleaned from a range of sources and presented without respect to order of importance (Heath & O'Hair, 2009; Lundgren & McMakin, 2009; McComas, 2006; NRC, 1989; Trumbo, 2001).

First, the message must be clear and accessible. The use of technical terms and numbers is often best set aside in favor of more immediate examples and accessible imagery. Clarity can be problematic, however. Oversimplification can lead to misunderstanding, especially when too much emphasis is placed on brevity.

Second, risk communicators need to be aware of, and sensitive to, common misperceptions. Failure here can lead to audience alienation. This becomes especially important when widespread misconceptions need to be dispelled. Misperceptions are best addressed directly and corrected in a non-judgmental way, rather than being written off. When the risk has or could cause death, audience sensitivities become a paramount concern.

Third, risk communicators need to be always aware of the distinction between informing people and influencing them. The public is adept at identifying messages that are designed to influence, and they do not expect (or respect) such messages from official or governmental agencies. There are three conditions under which influence strategies are specifically wrong: when the risk involves public controversy; when the communication strategy approaches deceit; and when the risk only applies to individuals who voluntarily expose themselves to the risk.

Fourth, risk communicators need to show the personal relevance to the individual. Risk analysis needs to be translated into advice for the individual concerning safety measures, political activity, self-evaluation for membership in risk groups, and strategies for further information gathering.

Fifth, risk communicators need to directly address elements of uncertainty. Uncertainty is almost always an important element of risk analysis, management, and communication. Uncertainty over risk arising from imperfect data and expert disagreement should be tackled head on. However, a balanced approach is best. Public distrust develops rapidly when communicators attempt to exaggerate or minimize uncertainty. When the risk involves public policy, differing viewpoints can sometimes seek to take advantage of polar arguments so they may gain sway on an issue. When addressing uncertainty, it is generally
Influence over their reaction to technical understanding is often less trusted. Dramatic changes are more strongly, especially when they are presented without respect to order of ideation & McComas, 2009; McComas, 2009. The use of technical terms can be more immediate examples and is a problem, however. Oversimplification occurs when too much emphasis is placed on what people are aware of, and sensitive to, common sense and the audience alienation. This becomes necessary when misconceptions need to be dispelled. 

We need to be always aware of the distinction between the risk and what it can or could cause death, injury or serious concern. The public is adept at recognizing risks, and they do not expect (or at least governmental agencies. There are three factors are specifically wrong: when the communication strategy approaches the public or individuals who voluntarily expose themselves to personal risk.

Common strategies show the personal relevance to the risk and are translated into advice for the individual to consider, self-evaluation for membership in the risk information gathering.

There are elements of uncertainty. To achieve a balance in the assessment of risk, management, and the risk arising from imperfect data and the way we deal on. However, a balanced approach is required when communicators attempt to minimize the risk involves public policy, where the balance of arguments is not addressing uncertainty, it is generally recommended that numerical and statistical representations be kept to a minimum and that common and clear language be employed.

Sixth, risk communicators need to be aware that the effective use of risk comparisons is very challenging. Properly used, comparisons can improve understanding of a risk. But comparisons should not be offered as the only way in which to make a decision, but rather as one of many ways. There are also real dangers to effective communication present in the type of risks that are to be compared. A good rule is to maintain similarity in the type of risks compared. For example, comparing the risk of flying 500 miles to the risk of driving 500 miles would be appropriate, while comparing the risk of 20 hours per week exposure to second-hand smoke with eating a peanut butter sandwich per day would not be appropriate. Other techniques for risk comparison that appear to be effective include the comparison of multiple risks rather than just two.

Finally, the risk message should be complete to the greatest degree possible. This is a key ingredient in any risk communication effort, as missing information can often have a greater impact in the long run than information provided early on. There are five critical pieces of information in a complete risk message: the kind of risk present (e.g. health vs. economic); how risks and benefits are intertwined; what options are available; how great the uncertainty is surrounding the risk; and how difficult it is for experts to manage the risk.

All of the valid guidelines that have been developed for risk communicators have as their basis elements of the research literature on risk perception. When these insights are applied to the task of message design a number of factors emerge for consideration by the risk communicator. Six such factors were identified early in the development of professional risk communication in the US National Research Council report on risk communication and have stood the test of time (NRC, 1989):

- People simplify. Information overload is a consequence of the modern world. People cope with this overload by utilizing simplified constructs to evaluate complex problems.

- It is difficult to change people's minds. The desire for cognitive consistency is a fundamental attribute of the human psyche. This can lead people to selectively attend to information that only agrees with previously formed attitudes, to ignore any ambivalence in that information and to become overly attuned to polarized arguments.

- People remember what they see. Thus, people evaluate many risks based on their personal experiences in life and the information they receive from the media. This can lead people to underestimate risks they have not personally experienced.

- People cannot readily detect omissions in the evidence they receive. This especially applies to the anecdotal evidence people gather through their daily lives. It also makes it possible to fool people through the use of omissions, the result of which is typically the eventual loss of all credibility.
People may disagree more about what risk is than about how large it is. The difficulty of defining risk itself is socially and culturally bound. People have difficulty detecting inconsistencies in risk disputes. It requires a considerable level of attention and knowledge to keep abreast of some of the more technical risk arguments. Applying critical thinking skills to those arguments can be even more daunting. Unfortunately, this leaves many members of the public vulnerable to manipulation.

While the manner in which a risk communication is formulated merits considerable attention, the mode through which the message is delivered is also a critical consideration by the risk communicator. Information channel consideration has become an increasingly important task for risk communicators because communication technologies can function uniquely for different audience segments. For example, while the Internet has become nearly ubiquitous, there is still a sizable segment of society with limited access by virtue of socioeconomic and to a small remaining degree geographic factors. The current explosion of social media poses a challenge since relatively little is yet known about its efficacy in the domain of risk communication.

When risk is involved audiences or important audience segments tend to be very active information seekers and will engage with information from a variety of sources and channels. The carefully crafted risk message must function in a very complicated information environment.

Conclusion

The bottom line for the risk communicator is clear: risk communication embodies all of the difficulties and opportunities for failure that plague public communication in general, and risk communication bears a greater burden than many other types of communication efforts. The subject matter is invariably complex, mathematical, controversial, and impacts people's physical safety and health.

In a review of the conventional wisdom of risk communication, Johnson and Fisher conclude that, "In short, the conventional wisdom that risk communication itself is a complicated, hazardous undertaking is quite correct" (Johnson & Fisher 1989, p. 37). But effective risk communication can be achieved. By understanding the audience, the nature of the risk at hand, and the goals of the communication it is entirely possible to craft a message and deliver it in a way that responsibly serves all parties involved to the maximum degree possible.

References

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Effective communication is formulated on the basis of which the message is delivered is also the communicator. Information channel is an important task for risk communicators that can function uniquely for different people. The Internet has become nearly immediate to an increasing amount of society with limited access by virtue of its simplicity. Increasing degree geographic factors. The challenge since relatively little is yet known of risk communication. Important audience segments tend to be engaged with information from a variety of sources. Crafted risk message must function in a fragment.

One is clear: risk communication embodies culture that plague public communication with a greater burden than many other types. Culture is invariably complex, mathematical, and safety and health.

The goal of risk communication. Johnson (1996) stated that the conventional wisdom that risk communication is hazardous undertaking is quite correct" and ineffective risk communication can be detrimental to the nature of the risk at hand, and the possible to craft a message and deliver it to the parties involved to the maximum degree

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Communicating the Significance of Risk


