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# The social psychology of public response to warnings of a nuclear power plant accident

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## Abstract

This article reviews the process of public response to warnings of an impending nuclear power plant emergency. Significant evidence exists to suggest that people engage in protective action in response to warnings based upon the substance and course through which emergency warning information is disseminated. The three basic components of a warning system are defined, and the elements of public response to warnings are summarized. Popular myths about public response to warnings are outlined and dispelled based upon current research verification. The conclusion provides an overview and synthesis of the warning response process. © 2000 Elsevier Science B.V. All rights reserved.

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## 1. Introduction

Public response to warnings of impending emergencies has been researched extensively across different hazard agents, and from a variety of applied and theoretical perspectives. The general conclusion of these works is clear and it is that the principles of how humans respond to warnings remain constant across hazard agents as diverse as floods, earthquakes, tornadoes, explosions, and toxic chemicals. Additionally, a recurring theme in this body of research is that people's protective response to warnings is a consequence of the perceptions they form immediately prior to taking action [1–4]. For example, evacuation and sheltering in-place are largely the result of people defining themselves as being in imminent danger and perceiving that the action they are taking is appropriate considering the circumstance. Consequently, it is important to understand

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the fundamental process whereby people define reality in order to understand how they respond to warnings since they act on these definitions in attempting to create their desired reality.

A basic point to bear in mind is that the process of forming perceptions is an ongoing human activity that is fundamental to, and transcends, all social life. That is, the perceptions that are formed in emergencies follow the same processes as those formed in response to any other social event. In this general perceptual process, new stimuli or motivations are continuously introduced into people's perceptual fields — what people perceive in the moment. Any encountered situation perceived as needing immediate attention engages people in active problem solving [5]. The definition of the situation that is necessary prior to any willful act arises from the presented event, but it also is affected by relevant beliefs, understandings, expectations based on past experience in similar situations, and cues from various events including the behavior of other persons in the immediate environment [6]. Moreover, the definition of the situation also is affected by defining attributes of the general public (i.e., economic, social, religious, educational, experiential, cognitive, and so on). Finally, the process is dynamic because perceptions are processed and reprocessed to fit into a context of reality. That is, what people think is real is their own reality and it changes over time.

There is significant research evidence supporting the applicability of this model in understanding how people become motivated to engage in protective action. Moreover, this research suggests that the communication process by which emergency warnings are disseminated plays a key role in the definition of risk perceptions [7–9]. Thus, the intent of this paper is to show how this model of perception formation affects public response to warnings of a nuclear power plant emergency.

## **2. Definition of a warning system**

Warning systems consist of three basic components: a detection subsystem, an emergency management subsystem, and a public response subsystem [10]. The first stage in the warning system is the detection of a hazard; that is, the recognition that an abnormal conditions exists. Once the hazard is detected, the second key step is to determine whether or not the hazard poses a significant threat to public safety. These stages are chiefly the responsibility of the personnel at the nuclear power plant. Once a threat is judged to be significant, the assessor then must determine who should be notified of the threat. The notification of a public official typically results in the activation of an emergency response system. The organization initially notified must decide whom else to involve in assessing the situation. Once mobilized, emergency managers must decide whether the risks warrant issuing a warning and, if so, what mechanisms must be used to warn the public? Finally, emergency managers must decide what type of protective action is needed. Even if the threat is simple and will impact only a small area, this decision-making process is likely to be interactive and contains numerous dynamic communication flows. As such, the model implicitly recognizes the need for integration among the sub-components, the need for timely and effective communication linkages, and the importance of decisions, including those associated with protective response.

An important consequence of this model is that the link between a nuclear power plant and the population at risk is not direct. Warning decisions usually are made by state, city, or county officials. The first step of a warning is the off-site notification of the appropriate community officials or point of contact. This step can be accomplished in a number of ways. Conventional communication systems, such as telephone and radio, are not viewed by experts as highly reliable forms of communication. Telephones can fail (sometimes from the same event that caused the emergency) or may be busy. Radios often operate at different frequencies, are inoperable, or are difficult to use because of heavy traffic on the appropriate frequency. As a result, communication systems must be designed to overcome such problems. These include dedicated telephone lines (separate lines not linked with commercial traffic), dedicated radios, pagers, and special alarm systems. Such systems are required by federal agencies and have become standard practices in the nuclear industry [11]. New technologies are being developed and implemented that can provide even greater reliability. These include fiber optic networks to exchange data, satellite communications, and microwave radios.

Good communication extends beyond hardware. One of the better predictors of good communication in an emergency is the quality of interpersonal interactions during normal times. People who know each other will work together in a crisis [12]. Another predictor of effectiveness is knowing who will be communicating with whom during an emergency as well as what they will be communicating about. One way to promote good communication is to conduct practice exercises on-site. Another way is to get people in the system to know one another in a less formal manner. For example, recreational sports teams or social events are mechanisms used to build cohesiveness and improve interpersonal communication.

### **3. The elements of public response to warnings**

#### *3.1. The general process*

Research findings suggest that people who receive emergency warnings go through the process described above in a sequential process that shapes their perceptions and subsequent actions and/or behavior. This process is the sequence hear–perceive (understand, believe, and personalize)–respond (decide about alternative protective actions and perform them).

The first stage, hearing the risk information, depends upon the areal extent of warning dissemination and ambient conditions within the warning zone [13]. For example, sirens might not be able to be heard if there is a strong wind and, especially, if people are indoors with noisy air conditioning or other equipment operating.

In the second stage, the risk information must be understood. Understanding is not meant to refer simply to interpretation, but also to the attachment of meaning to the information. Those meanings can vary among people and may or may not conform to the understandings intended. A 50% probability may be interpreted as almost certain by some or relatively unlikely by others. In this sense, understanding includes the perception of risk. The third stage is belief in the risk information and in the accuracy of what

is being communicated; in this way, belief also includes risk perception. The fourth stage is the personalization of risk; that is, the perceived implications of the risk being communicated on the receivers themselves; thus, personalization also encompasses risk perception.

The fifth stage involves people deciding what to do about the risk, while the sixth involves performing that behavior. Throughout the warning (risk information communication) period, a person typically goes through the stages of the model each time that new information is received. Thus, response to a warning message follows from a series of decisions. The formation of a risk perception is not a solitary event resulting from a single communication but instead is the result of an emerging process. Additionally, people do not passively await the arrival of more information; most people actively seek it out. This results in what has typically been referred to as the warning confirmation process [1,14]. This sequence and its human action outcomes are impacted by three categories of factors. The first is the content of the warnings received, the second is the style of the warning messages received, and last consists of warning recipient characteristics.

### *3.2. Warning message content*

Information presented in a person's environment acts as a stimulus or motivation to engage in the process of forming perceptions about a given situation. Information about a hazard and recommended protective action becomes a dominant stimulus setting people off on a course of forming a risk perception. Several information-specific factors have been demonstrated to shape an endangered public's perception of risk and subsequent actions aimed at resolving the presented problem. In an emergency, information factors can strongly and directly influence people's formation of a belief that the danger is real, needs special attention, and may require a protective response such as evacuating or sheltering in-place. These factors are largely related to qualities of the message; they are important to consider when understanding the determinants of human response in the risk communication process. Five specific topics are important to include in assembling the actual content of a public warning message. These topics are hazard, location, guidance, time, and source.

#### *3.2.1. Hazard*

A warning message must provide the public with information about the impending hazard that has precipitated the emergency warning. Every warning should consist of two parts: a description of the event that is expected to occur and an explanation of how it is a threat to people's safety. For example, it is not adequate for a warning message to state simply that radioactive material might soon escape from the nuclear power plant. Such a warning would leave the hazard in a "black box." Instead, the warning must describe the character of the impending hazard. For example, one might say that rising pressure in the containment building might cause an explosion that would destroy the protective seals around the control cables into the reactor building. This would allow radioactive material to be released into the air like a cloud and dissipate as it travels downwind. If a hazard is well described, people are better able to understand the logic of

protective actions — close the car windows while evacuating because the risk is in the air, get out of the streets because it is safer in a building basement, and so on.

The general principle to be observed when describing a hazard is that a warning message should provide enough detail for all members of the public to understand the physical character of the hazard agent from which they are to protect themselves. Vagueness in warning messages will result in different members of the public defining the hazard in different ways and then responding in ways consistent with those different definitions. Informing the public about the physical characteristics of the hazard in warning messages will minimize the likelihood of people misperceiving the hazard and subsequently making incorrect decisions about what to do.

### 3.2.2. *Location*

Warnings also must include the location of the impending hazard because the degree of risk is a function of proximity to it. Warnings must define the location of who is not at risk as well as those who are at risk, and this should be done in ways readily understandable to those who are intended to receive the warning. For example, a warning could say, “the area of town that will be affected will be between Second and Fifth Streets from Elm Avenue to Magnolia Boulevard.” In many cases, messages also should be directed toward other residents who are safe because researchers have found that some of them also will take protective action [13]. This is particularly important if evacuation by those who are not at risk might overload evacuation routes and the resulting traffic jams would endanger those who are closer to the source of danger. Such messages should say, for example, “People who live in other parts of the city will not experience any danger,” and then the warning should explain why.

### 3.2.3. *Guidance*

It cannot be assumed that the public will know what would constitute an appropriate protective action. Thus, the content of an emergency warning message must include information about what people should do to protect themselves from the impending hazard — a protective action recommendation (PAR). The recommended protective action must be described in detail. Although this point might seem obvious, it is not. Warnings, for example, must do more than tell people in danger that they should evacuate. For some, evacuate may be to the front yard. Instead, the evacuation route, destination, and (for those who lack their own vehicles) method of transportation should be clearly defined [13]. For example, people might be told to “evacuate north on Highway 31 until you have reached Safe Haven City” or “walk to the nearest elementary school and a bus will pick you up to take you to Safe Haven City.” In the case of sheltering in-place, guidance should instruct people to “go indoors, shutting doors, windows, and chimney flues, and turning off heaters or air conditioners.”

### 3.2.4. *Time*

The content of public warnings also must address the timing of public response. It is important to inform warning recipients about how much time there is before impact so they will know how much time they have to implement protective actions. For example, a message might say that “the plant conditions will not be serious before 10:00 p.m. this

evening, but to be on the safe side, you should be past the eastern border of the county line by 9:45 p.m.”

Frequency, or the number of times a warning message is delivered, affects hearing, understanding, and belief. Numerous studies underscore the importance of repeatedly hearing a message as a condition for adaptive risk perception and response [2,15–19]. Frequently repeated messages help to reduce the potential for public misperceptions by focusing people on official warnings, reducing rumors, and increasing public confidence in the validity of the warnings. In protracted emergencies, there might be a point of diminishing returns after which constant delivery of new information may be counter-productive. However, research indicates that people will patiently monitor a threatening situation for quite a while before losing interest. For example, most residents of the area around Mt. St. Helens monitored the radio four times a day or more for weeks after that volcano first became active [20].

### *3.2.5. Source*

The final dimension of a warning is the warning source. The source of a PAR shapes the perceptions of risk that the public form. Information from credible and reliable sources encourages information believability. Thus, the source should be identified in the warning message and be as much a component of it as is information about hazard, location, guidance, and time. Since people have different views about who is credible and who is not, PARs that come from a mix of scientists, reputable organizations, and public officials serve to facilitate perceived belief [1,8,21]. For example, “the mayor and the head of civil defense have just conferred with scientists from our local university and the Nuclear Regulatory Commission, as well as the head of our local Red Cross chapter, and we now wish to warn you that”

### *3.3. Warning style*

Each of the five parts of warning message content (hazard, location, guidance, time, and source) is readily juxtaposed against the dimensions of warning style that research suggests facilitates adaptive public warning response. These include specificity, consistency, certainty, clarity, accuracy, sufficiency, and channel. A description of these follows.

#### *3.3.1. Specificity*

Public understanding of communicated emergency information is enhanced if it is specific regarding the nature of the hazard agent, the risks of unprotected exposure, the location at risk, the recommended protective action, and the amount of time available before impact. All of these have been found to influence public personalization of the risk and subsequent response to the hazard [2,16,22–28]. Obviously, specificity on all content items cannot be high on many occasions because they are unknown or are known imprecisely. Even on these occasions, however, the warning message itself need not be nonspecific. Furthermore, the style with which it is written must remain specific. For example, a recommendation to shelter in-place might say that “we are unable to say which buildings in the city are the safest, but we do know that residents of the following communities will be protected best if they stay inside and do not attempt to evacuate.”

Clearly specifying the location of danger in a warning message is important in facilitating public belief and personalizing risk. Location-specific messages lead to greater levels of personalized risk in the public [28,29]. Detailing the locations at risk is best done by reference to landmarks that are readily identifiable to the public (e.g., highways, political boundaries, and rivers).

### 3.3.2. *Consistency*

The style of warning messages also must be one of consistency, both within messages and across different messages. A warning message promotes the formation of accurate perceptions if it is consistent in the information it provides with other publicly announced advisements [1,25,27,30–33]. Consistency was a problem during the accident at Three Mile Island, where over 10 times as many people evacuated as were advised to do so [34]. Of the evacuees, 83% cited confusing and conflicting information as a reason for leaving [22].

Inconsistencies can exist within a message for a variety of reasons and in many different ways. For example, it is inconsistent to tell the public that a nuclear power plant accident may result in a release of radioactive material but that they should not worry. However, it would be consistent to recommend that they monitor the situation for further information. Inconsistencies across different warning messages arise in most emergencies as more is learned about an impending hazard and updates are issued to the public. Inconsistencies can appear, for example, as new information reveals that the actual character of the hazard has decreased or increased, the number of people at risk has become larger or smaller, and so on. In such circumstances, consistency can be increased across messages simply by repeating what was last said, what has changed, and explaining why the situation has changed.

### 3.3.3. *Certainty*

Third, the style of a warning message is best if it demonstrates certainty about the factors about which it is conveying information. When there are low probabilities or ambiguities associated with a hazard's impact, the message should be stated with certainty (even about the ambiguity). For example, "there is no way for us to know if there really is going to be an explosion in the reactor, but we have decided to act upon the potential for an explosion by recommending that all those within 2 mi of the nuclear power plant evacuate now."

Certainty in warning messages extends beyond actual message content and also includes the style of delivery. The warning should be spoken by a source delivering the message in a tone which conveys that he/she believes or is certain about what is being said. Public information enhances PAR compliance if it conveys a high level of certainty about the events taking place and what people should do. Even in an ambiguous situation a message stated with certainty will impact public belief in the message and affect decision-making [9,20].

### 3.3.4. *Clarity*

Clarity, a fourth style attribute of warning messages, simply means that warnings must be worded clearly in simple, straightforward language that can be understood by

the general populace. For example, “a possible transient excursion of the reactor may result in a sudden relocation of the core materials outside the reactor vessel” would better be clarified by stating, “radioactive materials are likely to be released from the nuclear reactor.” A warning message that advises protective action by the public must be worded in simple language so that it can be understood [27]. Lack of clarity can lead to public misunderstanding of the message [21,35].

### *3.3.5. Accuracy*

The fifth style attribute of warning messages is accuracy. Warning messages can vary in the extent to which their content is perceived to be accurate in terms of hazard, location, guidance and time. Such perceptions have been found to cause people not to believe what they hear [14]. If people suspect that they are being lied to, or even that they are not receiving the whole truth, they may well lose the ability to believe further messages from that source. Perceived accuracy is enhanced simply by being fully open and honest with the public from the outset of an emergency.

### *3.3.6. Sufficiency*

Sufficient information in a message facilitates the formation of sound public perceptions of exactly what is happening and what to do. Insufficient information creates confusion and uncertainty. Too much detail may be overwhelming. The amount of information provided affects understanding, personalization, and belief. For example, a study of family response to natural disaster warnings found that general and vague messages caused people not to take protective actions [36]. Conversely, a study of response to the Mt. St. Helen’s eruption found that detailed information led to higher levels of perceived risk and a greater likelihood of public protective action being taken [29].

### *3.3.7. Channel*

The avenues through which the information is delivered shapes public perception and action. Warnings can be issued to the public in a variety of ways: voice, electronic signals, or in print. Voices can be direct or broadcast over loudspeakers, public address systems, telephone, radio, or television. Signals include sirens, alarms, whistles, signs, and lights. Leaflets, brochures, or video can be used to distribute graphic information and printed messages. Information communicated over multiple channels, such as printed and electronic media or personally delivered, has been demonstrated to enhance public understanding, belief, and response [2,9,22,24,28,37].

## *3.4. Receiver characteristics*

Information factors affecting public response to warnings do not operate in isolation. Research shows that warning response is affected by a variety of characteristics of the warning recipients. These factors, which people bring to an emergency, fall into six categories.

### *3.4.1. Cues*

Environmental cues, which are the physical characteristics of the setting in which the public receives emergency information, interact with the information factors previously



described. For example, it is more difficult to get a public to believe a flood warning on a sunny day or if neighbors are not seen leaving in concert with receiving evacuation instructions. Location of the risk or geographical proximity of those at risk to the impending threat is another physical factor that affects the perception formation process [38–40]. Such environmental cues impact the perceptions of understanding, believing, personalizing, as well as actual action [1,14,22,27,41,42].

#### 3.4.2. *Social setting*

Social setting factors include whether or not the family is united when the warning is delivered, what activities are being performed at that time, and what others are doing to respond. Social setting factors affect public belief and action [21,22,30,43,44]. Mack and Baker [45], for example, reported that family unity at the time of a warning increases the likelihood of belief; and Drabek and Stephenson [21] similarly noted that families who are united at the time of a warning are more likely to respond to the warning. In addition, the evacuation of neighbors and friends is a major influence on the decision to evacuate [41].

#### 3.4.3. *Social ties*

Social ties also affect perceptions and evacuation [8,30,46,47]. Perry [52], for example, found that as family cohesion increased, the likelihood of evacuating in response to a flood warning concomitantly increased. Alternatively, knowing someone who worked at Metropolitan Edison was related to decisions not to evacuate during the TMI emergency [48].

#### 3.4.4. *Social structure*

Characteristics of the risk area population — such as resources, gender, or socioeconomic class — can influence understanding, belief, personalization, and response [9,22,28,49–52]. For example, in an analysis of the TMI accident, Sorensen and Richardson [48] found that older people were less likely to evacuate. While not well understood, gender has also been found to be related to warning belief. Women are more likely to believe a warning than men [1,9,51].

#### 3.4.5. *Psychological factors*

Psychological characteristics such as cognitive abilities or personality can influence how a warning is interpreted. Limitations in cognitive abilities can be a constraint to accurate perceptions if people are provided with too much information [9,22,52–54]. Personality also is related to perception formation and action. The personality factor investigated most extensively in the context of warning response is *locus of control*. Simply stated, people with an internal locus of control are self-determined and tend to feel they have control over their fate [55]. Conversely, people with an external locus of control have fatalistic views of the world and feel their fate is in the hands of chance, powerful others, or “divine power.” Those with an internal locus of control are more likely to believe, personalize, and respond to a PAR than the latter [9,22,23].

### 3.4.6. *Pre-warning perceptions*

People filter information to conform with their pre-existing views of the world. Consequently, preconceived ideas of an emergency can impact situational perceptions of risk. If their perceptions of the hazard are inaccurate, people may disregard warnings [8,17,22,56,57] or respond unnecessarily [57]. Moreover, people who have erroneous beliefs about protective actions may fail to comply with official PARs [58].

### 3.5. *Myths about public response to warnings*

After examining the extensive amount of information available concerning warning systems and public response to warning, one would think that most popular myths surrounding public response to hazard warnings would be dispelled. In reality, this is not the case. Not only the general public, but surprisingly many emergency managers as well, believe in a set of widespread myths about public response to warnings. Unfortunately, the belief in these myths often constrains the effectiveness of warning systems when they are used. Consequently, it is important that those who design and implement warning systems should not fall prey to these myths. Several popular myths can be dispelled as follows.

#### 3.5.1. *People panic*

First, it cannot be overemphasized that the public simply does not panic in response to warning of impending disasters, including nuclear power plant accidents. This myth is largely the result of movie producers who depict masses of screaming, fleeing, completely panicked individuals in dangerous scenarios. This is not to say that people never panic, but panic only occurs in very particular circumstance that rarely, if ever, can be found in an actual emergency. These conditions include people being in a closed room with an immediate and clear source of death, and the presence of an escape route for which it is obvious that there is insufficient time for everyone to escape with their lives. Note that panic behavior is different from elevated stress, which is a psychological response that the public and media often label as panic. The negative consequence of the myth of panic is that warning officials are reluctant to tell the truth or may withhold warning information because they are afraid of causing panic. As discussed earlier, people typically respond to warnings by doing everything in their power to obtain more information. Thus, withholding information from the public — whether that information is good or bad — is quite detrimental to the overall warning process.

#### 3.5.2. *Warnings should be short*

The public rarely, if ever, gets too much emergency information in a warning [18]. It is true that people do not remember all the information contained in a warning if they hear it only once. Thus, detailed messages can and should be repeated in an emergency. Warning messages simply are not subject to the 30-s rule known to operate in advertising attempts to sell consumer products. People are “information hungry” in an emergency, and they should be provided with all the information they need. This myth is often reflected by the terse message protocols that are designed to guide information dissemination in an emergency. There is no evidence whatsoever in the extensive body

of research on warning response that a message was so lengthy that it exceeded warning recipients' attention spans.

### *3.5.3. False alarms are problems*

The effectiveness of people's responses to warnings is not always diminished by what has come to be labeled the "cry wolf" syndrome. Two issues regarding false alarms are significant. The first concerns a false alarm that leads to public response, such as an evacuation. In this case, the integrity of the system will be preserved if the reasons for the mistake are clearly communicated to the public [59]. The second concerns repeated activation of the alert mechanisms. If such false alarms occur and no attempt is made to explain why they were false alarms, subsequent public response to the alert of an event could be affected negatively [60]. This is particularly true of inadvertent sounding of sirens; people eventually will ignore the sirens in a true emergency if such malfunctions are frequent and not explained. However, if false alarms are explained, they can actually enhance public hazard awareness and ability to process risk information during later warning events. As such, many false alarms are better viewed as opportunities than as problems. A good emergency plan will have a procedure for explaining false alarms. Decision-makers should also be assured that the public prefers to err on the side of caution.

### *3.5.4. A single spokesperson is necessary*

People at risk who are the targets of emergency warnings want information from a variety of sources rather than from a single spokesperson [61]. This procedure helps individuals to (1) confirm the warning information and the situation; and (2) believe the content of the warning message. However, different or conflicting warning messages from multiple spokespersons are not desirable. Consistency could be achieved in one of two ways. Different spokespersons could all deliver the same message, or a panel of spokespersons could deliver a warning a multiple set of times.

### *3.5.5. People take protective action immediately after the first warning*

People simply do not take action in response to warning messages as soon as they hear the first warning [2]. Instead, people seek more information about the impending hazard and appropriate responses from those they know personally, from the newsmedia, and from authorities. People call friends, relatives, and neighbors to find out what they plan to do, and they also turn on the radio and television to get more information. Unless there is a clear explanation of the need for an immediate response, they might wait for a second, third, or fourth official warning before responding. For this reason, a good warning plan should call for frequent messages in the early stages of emergencies.

### *3.5.6. People automatically follow instructions*

Contrary to popular belief, people are most likely to follow instructions in a warning message only if the basis for the instruction is given in the message and that basis makes sense to them [62]. If instructions in an official warning are not clear and readily understandable, people typically will behave according to other information sources that do make sense. Warning messages should clearly define the rationale for all recommended actions.

### 3.5.7. *People remember siren patterns*

Last, people typically do not remember what various siren signal patterns mean but will try to find out the reason for a siren sounding if it continues or is repeated. Sirens, therefore, are best used as signals for the public to seek out emergency information rather than as signals that should elicit specific protective actions. For example, it would be inappropriate to use a steady tone to indicate an evacuation and an undulating tone to indicate sheltering in-place. An exception may occur when there are frequent siren drills that allow responses to become automatic. This may be of use in work or school settings or in special situations that can be supported by an intensive education program, but would be inappropriate for the general public.

### 3.6. *Overview and synthesis*

The receipt of information from authorities does not directly stimulate action. Instead, it initiates an intervening process of perception formation within which a process of interpretation occurs simultaneously. This process of interpretation, or actively defining the threat as real, is guided by the stimulations, cues, suggestions, and definitions people secure from their environment [63]. It is within this context of interpretation and perception formation that a sense of reality is developed and frames of action are created [5,63–70]. This interpretation stage of the perception formation process is the point at which the warning message being disseminated to an endangered public has the potential to strongly influence perceptions of risk.

The public's perceptions of risk are influenced significantly by characteristics of authorities' warning messages. Although information and contextual factors jointly affect risk perception and response, the information in warning messages can come to exercise a dominant influence on risk perception if it is formed according to the message style factors outlined in the previous sections. In particular, research has demonstrated that specific, consistent, certain, clear, accurate, and sufficient information can promote the development of an appropriate definition of the situation. Moreover, a warning message will be most effective when information is repeatedly and consistently delivered and when it enters into the informal communication processes that are stimulated by the warning confirmation process operating within the risk area population. By guiding the warning recipients' definition of the situation, authorities can maximize compliance with the PARs that are most likely to successfully protect an endangered public.

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