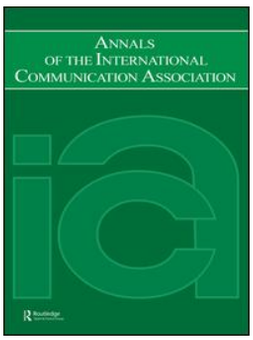

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10 Generating Effective Risk Messages: How Scary Should Your Risk Communication Be?

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No consensus exists on how to develop effective risk messages that motivate appropriate action yet do not unduly frighten people. A useful framework for developing risk messages is the extended parallel process model (EPPM). The EPPM suggests that when people are faced with health or environmental risks, they are motivated to either control the danger or control their fear. This chapter offers a description of how the EPPM can explain public responses to risk messages, and then reports on two pilot studies that illustrate how existing audience perceptions can be used in the design and generation of effective risk management messages.

RISK managers continually search for effective ways to disseminate risk information to the public. Unfortunately, "despite agreement that the way information is presented matters, there is no clear consensus in the literature about what specific features communicate risk concepts well" (Johnson, Fisher, Smith, & Desvousges, 1988, p. 30). Further, "while risk communication among technical people may be more or less straightforward (for example, interagency dialogue), risk communication with the public remains quite elusive" (Devgun, 1991, p. 7).

Much research has gone into establishing how individuals perceive risks, how people make decisions regarding risks, and how risks are quantified by experts (e.g., Douglas, 1985; Kishchuk, 1987; Slovic, 1987). However, little has been done to develop a theory of how to communicate risks effectively to the public in a manner that (a) motivates appropriate risk reduction behaviors, as well as (b) prevents panic and/or outrage among those faced with environmental and/or

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technological risks. The goal of the present work is to provide theoretical and methodological guidelines for developing effective risk management messages that result in appropriate public action. This chapter is intended to help both risk managers, who must inform and educate the public about environmental and technological risks, and public health practitioners, who must persuade people either to reduce or to engage in certain behaviors in order to decrease health risks.

A useful framework for conceptualizing and developing messages aimed at managing risks is offered by the extended parallel process model (EPPM), a recently developed fear appeal theory based on 40 years of empirical research, that integrates previous theoretical approaches. In the following section I describe how the EPPM can be used to explain public responses to risk messages. I then present two pilot studies that illustrate how existing audience perceptions can be used in the design and generation of effective risk management messages.

USING FEAR APPEAL THEORY TO DEVELOP RISK MESSAGES

Fear Appeals and Risk Communication

The EPPM is a "fear appeal" theory. Fear appeals are defined as messages that evoke fear by focusing on severe and probable threats in order to induce adherence to recommended courses of action. Typically, fear appeals contain two sections. The first attempts to increase *perceived threat* by emphasizing the *severity* of the threat (i.e., its magnitude of harm) and the *probability* of the threat's occurrence (i.e., the audience's likelihood of experiencing that threat). Fear is aroused when a threat is perceived as likely and severe. The second section of a typical fear appeal attempts to increase *perceived efficacy* about the recommended response by (a) outlining specific feasible and easy steps to avert the threat (*self-efficacy*) and (b) emphasizing the effectiveness of the recommended response in averting or minimizing the threat (*response efficacy*).

By definition, risk messages appear to be fear appeals. For example, risk experts define risk as the quantitative estimate of P (probability of an outcome) $\times$ S (severity of consequences) (Douglas, 1985). Thus both risk messages and fear appeals focus on (a) how likely it is that a hazard or threat will occur, and (b) how severe the hazard will be if it does occur. As in fear appeals, risk messages sometimes offer specific solutions or recommended responses (efficacy messages) to avert or minimize harm from the threat. Unfortunately, this portion of a risk message is often missing and may be a key reason for negative responses to risk mes- sages. By focusing on the risk or threat of a hazard, communications about risk tend to evoke fear in audiences. Because risk messages can arouse fear in audiences, the processes underlying responses to fear appeals may be identical to the processes underlying responses to risk messages. By applying what we know from fear appeal research to risk communication research, we may

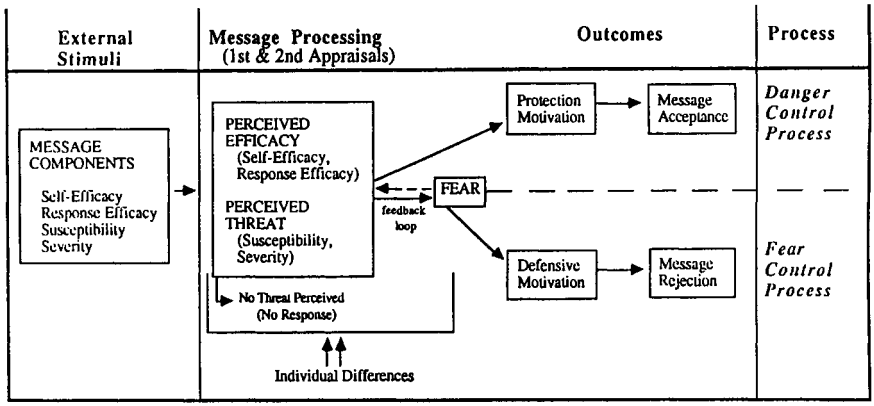

Figure 10.1. The Extended Parallel Process Model

improve our ability to produce effective risk management messages as well as to understand why some risk communications backfire.

The EPPM

Recent fear appeal research has focused on explaining the mechanisms and processes underlying individuals' rejection and/or acceptance of fear-arousing messages (Witte, 1994). The extended parallel process model (Witte, 1992a) is based on Leventhal's (1970) danger control/fear control framework and is an expansion and integration of previous fear appeal theories (e.g., Hovland, Janis, & Kelly, 1953; Janis, 1967; Rogers, 1975, 1983). According to the EPPM, the evaluation of a fear appeal (or, in this case, risk message) initiates two appraisals of the message, which result in the domination of either danger control or fear control processes (see Figure 10.1). First, individuals appraise the threat of the hazard. The more they believe themselves to be threatened by a serious danger, the more motivated they are to begin the second appraisal, which is an evaluation of the efficacy of the recommended response. If the threat is perceived as irrelevant or insignificant, there is no motivation to process the message further, and the fear appear elicits no response. When threat is perceived as high, the appraisal of efficacy determines whether danger control or fear control processes will dominate. Thus perceived threat determines the *extent* of a response (i.e., how strong the danger or fear control responses are), whereas perceived efficacy determines the *nature* of the response (i.e., whether danger or fear control responses are elicited). If no information regarding the efficacy of the recommended response is given, individuals will rely on past experiences and prior beliefs to determine their level of perceived efficacy.

When people realize they are susceptible to a serious threat and believe they can successfully avert it (i.e., high perceived threat/*high* perceived efficacy; e.g., "I'm at risk for skin cancer, but am able to use sunscreen to successfully

prevent it"), they become motivated to protect themselves and think of strategies to control the danger or threat. These cognitive *danger control processes* generate protection motivation, which stimulates actions, such as attitude, intention, or behavior changes, that reduce or diminish the threat (e.g., "I'm going to wear sunscreen the next time I'm at the beach to prevent skin cancer"). However, at some critical point, when persons realize they cannot prevent a serious threat from occurring—because they believe the response to be futile, they had no prior efficacy-related thoughts or beliefs, or they believe they are incapable of carrying out the recommended response (i.e., high perceived threat/*low* perceived efficacy; e.g., "I'm at risk for skin cancer, and there's nothing I can do to effectively prevent it—it's too late for me")—fear control processes will begin to dominate over danger control processes. *Fear control processes* are primarily emotional processes through which people respond to and cope with their fear, not the danger. Defensive motivation is elicited by heightened fear arousal, which occurs when perceived threat is high and perceived efficacy is low and produces defensive avoidant or reactant responses that control the individual's fear (e.g., "I'm just not going to think about skin cancer, it scares me too much"). In earlier work, it has been shown that fear control processes interfere with danger control processes such that there is an inverse relation between fear control responses (e.g., defensive avoidance, reactance) and danger control responses (e.g., attitudes, intentions, behaviors) (Witte, 1992b). For example, when a person is denying the threat of AIDS (controlling one's fear), he or she is not asking a partner to use condoms (controlling the danger). In short, message recommendations are accepted when danger control dominates and rejected when fear control dominates. Thus message acceptance is defined as attitude, intention, and behavior change, and message rejection is defined as defensive avoidance, minimization (denial), and perceived manipulation (reactance). Much research has shown that perceived threat and perceived efficacy interact in the manner just described to influence behavioral or psychological outcomes (e.g., Kleinot & Rogers, 1982; Maddux & Rogers, 1983; Witte, 1992c).

The Critical Point

The notion that perceived threat and perceived efficacy are compared in some subjective manner by the individual is implied in the appraisal processes. For example, even though the second appraisal process is said to focus on efficacy, it is more accurate to state that this appraisal is really an *appraisal of efficacy in light of perceived threat.* That is, if the threat is perceived as significant and/or relevant enough, then efficacy is appraised. In this second appraisal, individuals are believed to weigh (either deliberately or automatically) perceived efficacy against perceived threat in a *joint appraisal process* to determine whether anything can be done to prevent the threat. As long as perceived efficacy is greater than perceived threat (e.g., "I know that AIDS is a terrible threat, but if I use condoms correctly, I can protect myself"), danger control processes will

dominate. But when perceived threat outweighs perceived efficacy (e.g., "I'm at risk for this terrible disease and there's no way I can effectively prevent it"), fear control processes will dominate. This point, where perceived threat begins to outweigh perceived efficacy, is when fear control processes begin to dominate over danger control processes; this is the *critical point.*

The two parts of Figure 10.2 show that the critical point (where threat exceeds efficacy) is never reached when perceived efficacy is high. Because perceived efficacy always exceeds perceived threat in the top lines of both parts of the figure, message acceptance is positive and linear. For example, people always feel able to cope successfully with the threat and become increasingly motivated to accept the message as threat increases. However, in the low-efficacy condition, the critical point occurs immediately (top part of Figure 10.2), because individuals believe there is no effective response that would feasibly avert the threat. Thus the message is rejected because individuals defensively avoid or react against the threat. Finally, in the moderate-efficacy condition, the critical point is reached when threat is at a moderate level (bottom part of Figure 10.2). In this case, people feel able to cope successfully with a threat up to a point, but as threat continues to increase—and efficacy remains constant—the threat suddenly seems insurmountable and they give up any danger control actions and begin to cope with their fear. The critical point is a key construct in the EPPM that heretofore has not been explored. Later, I will return to this construct and expand on it.

Parallels Between the EPPM and the Risk Literature

There are several parallels between the risk perception literature and the constructs outlined by the EPPM. First, it is important to note that members of the general public (i.e., nonexperts) do not estimate risks in the same manner as experts (Kishchuk, 1987). For example, objective estimates of risk (generated by the Probability × Severity formula) may occur at "acceptable" levels for risk managers (e.g., 1 out of 1 million) but still be perceived as too risky by the general public (Slovic, 1987). Subjective factors such as whether a hazard is perceived as controllable, familiar, voluntary, necessary, catastrophic, personally relevant, or representative are more likely to influence nonexperts' risk perceptions (Kishchuk, 1987; Slovic, 1987). Slovic and others (1987; Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978; Slovic, Fischhoff, & Lichtenstein, 1982) have demonstrated that these and other qualitative risk dimensions cluster into two main factors: (a) dreaded-common and (b) unknown-known.[1] Dreaded risks are characterized by "perceived lack of control, dread, catastrophic potential, fatal consequences, and the inequitable distribution of risks and benefits" (Slovic, 1987, p. 283). Unknown risks are those perceived to be "unobservable, unknown, new, and delayed in their manifestation of harm" (Slovic, 1987, p. 283).

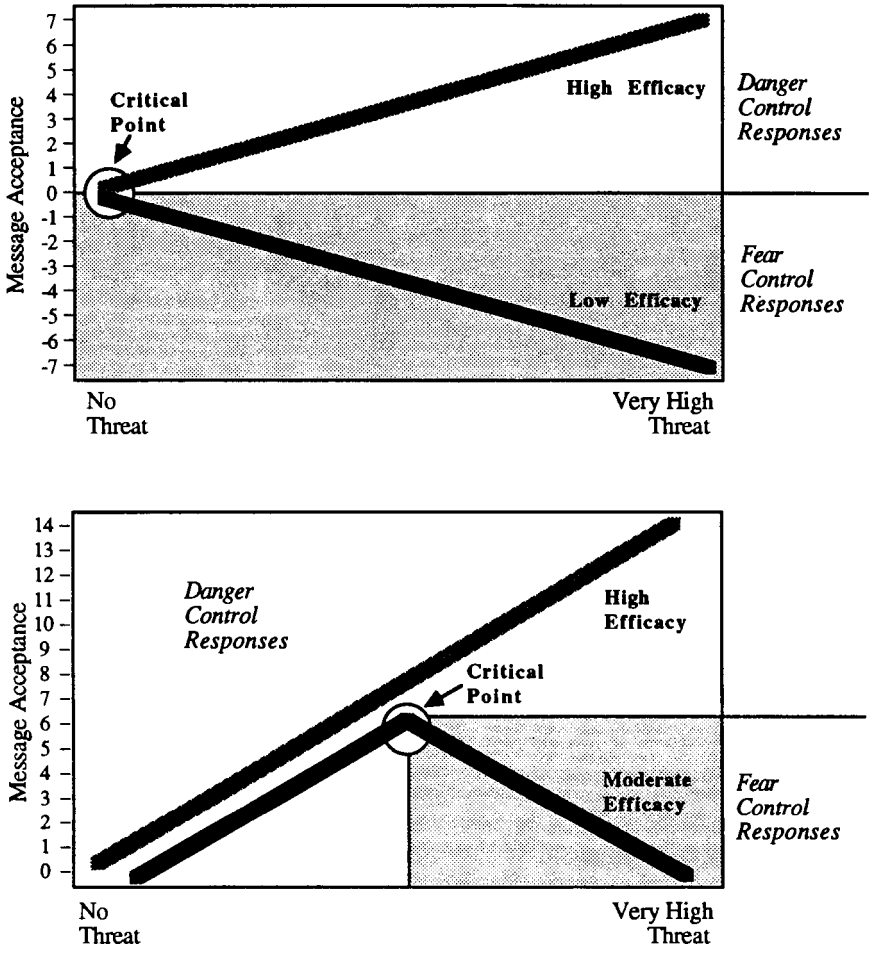

Figure 10.2. Examples of the Critical Point

Figure 10.3 shows the kinds of hazards that fall into each quadrant for the various combinations of the dreaded and unknown dimensions.

There appear to be many similarities between how people perceive risks and how the EPPM explains reactions to fear-arousing messages. Specifically, consider the possibility that the four quadrants of risk can be conceptualized in terms of perceived threat and perceived efficacy levels (see Figure 10.3). Although they do not fit perfectly, it appears that perceived threat is similar to the dreaded-common dimension, and perceived efficacy is related to the known-unknown dimension. For example, perceptions of threat appear to vary along the dreaded-common dimension, with dreaded risks producing the strongest perceptions of threat and common risks producing the weakest perceptions of threat. Similarly, perceptions of efficacy appear to vary along the unknown-

Common/Unknown Risks		**Dreaded/Unknown Risks**
Water Fluoridation Saccharin Water Chlorination Oral Contraceptives		DNA Technology Radioactive Waste Nuclear Reactor Accidents Nuclear Weapons Fallout
Low Perceived Threat/ *Low Perceived Efficacy*	1	2 *High Perceived Threat/* *Low Perceived Efficacy*
Common/Known Risks	4	3 **Dreaded/Known Risks**
Bicycles Home Swimming Pools Downhill Skiing Recreational Boating		Coal Mining Accidents Handguns High Construction Aviation
Low Perceived Threat/ *High Perceived Efficacy*		*High Perceived Threat/* *High Perceived Efficacy*

Figure 10.3. Hazards Associated With the Dimensions of Risk and Perceived Threat/Perceived Efficacy Levels

NOTE: See Slovic (1987) for further information on where hazards fall in multidimensional space.

known dimension, with unknown risks producing the weakest levels of perceived efficacy (e.g., people don't know or think they can't do anything to diminish their risk of harm because not much is known about the hazard) and known risks producing the strongest levels of perceived efficacy (e.g., people know what to do to reduce risks). An analysis of the hazards listed in the quadrants of Figure 10.3 adds further support to this analysis, in that laypersons seem to be motivated to respond to risks (in either a danger control or fear control manner) for some quadrants and not motivated to respond to other risks because of lack of perceived relevance or importance for other quadrants. The level of perceived threat and perceived efficacy that characterizes each quadrant offers an explanation for public responses to these hazards.

For example, those hazards that laypersons have deemed the most dreaded and most unknown also appear to be the same hazards for which there is high perceived threat and low perceived efficacy (quadrant 2). According to the EPPM, great fear would be associated with these hazards (given the high-threat/low-efficacy condition), and as a means of coping individuals would engage in fear control strategies. For instance, those living next door to a nuclear reactor may minimize or deny any chances of an accident, engage in reactance through angry protests, or simply ignore the fact that they live next door to the reactor (defensive avoidance). A message that tries to minimize a perceived serious and catastrophic threat while neglecting the efficacy of recommended responses in

averting harm from the threat can inadvertently produce fear control responses. For example:

> In the wake of the Chernobyl accident there was a tendency for the authorities in European states to respond with what they thought were reassuring messages about the safety of nuclear reactors in their own countries. But in the circumstances this may not have been appropriate. An opinion poll carried out in France near the nuclear power stations at Chinon and Civaux showed that on average 11% of people wanted information relating to accident risks against 40% wanting information on measures to protect the public if an accident took place. A further 43% wanted information on measures to prevent accidents and on the consequences of radioactivity exposure. (Cannell & Otway, 1988, p. 524)

To increase perceptions of control (and thereby increase perceptions of efficacy in dealing with the threat), clear and specific information should have been given to the public about what to do in the event of an accident, as well as what to do currently to minimize potential harms from the hazard. Note that in this example, experts focused on reducing perceptions about the severity of the hazard (thereby attempting to reduce perceptions of threat), but did not address efficacy issues. People wanted to increase their perceptions of control (i.e., efficacy) and wanted to know what to do in the event of an accident. Thus risk management messages must address not only perceived threat issues (i.e., likelihood and severity of threat issues), but perceived efficacy issues (i.e., What are the recommended responses should the hazard occur, and what do I do?) in order to avert negative reactions to risk messages.

In contrast, when hazards are viewed as common (quadrants 1 and 4 of Figure 10.3), they appear to be seen as low in threat. That is, people either do not believe they are susceptible to harm from these hazards or do not believe the hazards to be severe. When perceived threat is low, regardless of efficacy level, the EPPM would predict little motivation to reduce any risk (neither danger nor fear control processes would be initiated). The risk is seen as somewhat trivial and/or irrelevant. An example of a perceived threat that was so low it did not provoke any response—either danger or fear control—was the case of geological radon. Geological radon is a severe enough threat (typically leading to lung cancer) that in 1988, the "Environmental Protection Agency and the Office of the Surgeon General jointly announced that 80 million U.S. households (everyone not in an apartment above the second floor) should test their homes for radon. . . . [Radon] kills lots of people" (Sandman, 1988, pp. 2, 6). Perceived efficacy for solving any threat of radon should have been high. As Sandman (1988) notes, "[Radon] is fairly easy to solve. It offends no industry and costs no jobs. And it requires individual rather than government action" (p. 6). He also points out that radon tests are simple and inexpensive. Even though experts viewed radon as a high-threat/high-efficacy condition (which should have initiated danger control responses), public response was minimal. The main reason for

this lack of response was that the public did not perceive geological radon as a significant or relevant threat. Thus, regardless of how easy it was to test for radon (i.e., high efficacy), it did not matter because the threat was perceived as negligible and/or irrelevant. For example, besides "downplaying their own risk" by believing "their radon levels to be lower than average," the general public "also greatly underestimated the seriousness of radon" (Sandman, 1988, p. 7). Apathetic responses by the public to certain risks, such as that of geological radon, appear to result from lack of perceived threat of the hazard (i.e., "It's not really a severe threat; I'm not really vulnerable to it").

Finally, those hazards that are perceived as dreaded and known also appear to be the same hazards that produce high perceived threat *and* high perceived efficacy, resulting in danger control responses. Thus the hazards in quadrant 3 of Figure 10.3 may be perceived as dangerous, yet individuals are motivated to take appropriate precautions because they believe they can easily do so. For example, elaborate safety procedures and training are promoted for hazards considered high in perceived threat and efficacy, such as construction work or aviation practices. Additionally, in the case of geological radon, those individuals who did view radon as a significant and relevant threat engaged in danger control responses and took steps to avert the threat (recall that efficacy was high too). Specifically, "people who believed that radon was likely to be a serious problem in their own home were more inclined to test" (Sandman, 1988, p. 8). Thus, consistent with the EPPM, when perceived threat and perceived efficacy were high, people were motivated to control the danger.

In sum, the EPPM suggests that people respond to fear-arousing or risky messages in one of three ways. First, if the threat is perceived as irrelevant or trivial, people ignore it and do nothing to protect themselves against health, environmental (i.e., natural disaster warnings), or technological risks. Second, if the threat is perceived to be high, and individuals believe they can effectively minimize their chances of being harmed by the threat, they engage in behaviors that control the danger. Third, if a threat is perceived as very high, and individuals believe it is uncontrollable and they must be exposed to it involuntarily, they engage in fear control responses. They do not cognitively consider the threat; instead, they react emotionally (overwhelmed with fear) and lash out at those perceived as producing the threat (reactance).

By knowing which of the four quadrants a hazard falls into, we can predict whether danger control or fear control responses will be produced. Additionally, we can diagnose what it is about a certain hazard that produces unanticipated outcomes and then generate messages designed to counteract any needlessly high or low threat or efficacy perceptions.

Using the EPPM to Generate Risk Messages

As suggested by the preceding analysis, it is probable that individuals engage in either fear control or danger control *prior* to the evaluation of any risk message.

For instance, most people already have a great deal of knowledge about AIDS and, because of this, have existing perceptions of threat and existing perceptions of efficacy. Similarly, many in the risk field have noted that "new information is evaluated in terms of people's existing values and beliefs" (Cannell & Otway, 1988, p. 524). According to the EPPM, it is likely, therefore, that those with high perceptions of threat and high perceptions of efficacy are already engaging in danger control processes, whereas those with high perceived threat and low perceived efficacy are already engaging in fear control processes.

Consider the case of AIDS. If people believe themselves to be at risk for the disease and also believe they can easily and effectively use condoms to prevent contraction of HIV (i.e., existing high-threat/high-efficacy perceptions), then they would be likely to control the danger (i.e., AIDS) by performing self-protective behaviors (i.e., using condoms). Conversely, if people believe themselves to be at risk for AIDS, but they believe either that recommended responses like condoms are ineffective in preventing HIV contraction or that they are incapable of successfully using condoms to prevent HIV transmission, then they would be likely to control their fear by denying or defensively avoiding the threat of AIDS.

From a public health or risk manager's standpoint, discovering *prior* to a campaign or the release of risk messages whether individuals are engaging in danger control or fear control is of great importance if the messages are to have the intended effect. Specifically:

1. If one's targeted audience is currently engaging in fear control processes, then the messages developed should focus on the efficacy of the recommended response in order to counteract the already high levels of perceived threat.
2. Conversely, if a targeted audience is currently engaging in danger control processes, the messages should encourage the continuation of danger control responses by focusing on the persistent threat (to keep protection motivation at a high level) as well as the efficacy of the recommended response.

One purpose of this chapter is to offer a predictive formula that identifies whether a targeted audience is engaging in fear control or danger control processes. This predictive formula acts as a diagnostic tool and offers an easy method for determining existing audience beliefs within the EPPM theoretical framework. Once practitioners or risk managers discover which parallel process is dominating in a given audience, they can devise effective and theoretically guided messages.

Below, I develop the discriminating value formula derived from the EPPM that can be used to predict audience reactions to risk messages. I will then report on two pilot studies that tested the formula's predictive ability.

Predicting the Parallel Process: The Discriminating Value Formula

Overall, the point at which perceived threat surpasses perceived efficacy is likely to be dependent on the study topic, population, or individual differences in the subjects. However, predictions concerning whether a given person or population will engage in fear control or danger control processes are possible utilizing the following equation, which will be tested in the reported studies:

$$\frac{\text{(Z-Perceived Efficacy)} - \text{(Z-Perceived Threat)}}{\text{Discriminating Value}}$$

This equation attempts to quantify the joint appraisal process—the implicit or explicit "weighing" of perceived threat against perceived efficacy by an individual—by summing separately items measuring perceived threat (susceptibility and severity) and items measuring perceived efficacy (response and self-efficacy) to create perceived threat and perceived efficacy variables. The robust interactions between threat and efficacy found in the empirical fear appeal literature justify "weighing" threat and efficacy against each other in a joint appraisal (e.g., see reviews by Witte, 1992a, 1992b). Thus it makes sense that, given this interaction, there is some sort of weighing process taking place.

First, the threat and efficacy items are standardized, to create comparable scales. Then the threat and efficacy items are summed. Next, the perceived threat sum is assigned a negative value, because we are interested in weighing perceived threat *against* perceived efficacy. Finally, negative threat and positive efficacy are summed to yield a "discriminating" value. This discriminating value will indicate whether fear control or danger control processes dominate. A positive discriminating value indicates that perceived efficacy exceeds perceived threat and that danger control processes dominate. Thus a positive score would predict danger control outcomes (i.e., message acceptance) such as attitude, intention, or behavior change. Conversely, a negative discriminating value would indicate that perceived threat exceeds perceived efficacy, and fear control responses (i.e., message rejection)—fear control outcomes such as defensive avoidance or reactance, for example—would be expected. *Zero* is the turning point in the discriminating value equation where perceived threat begins to exceed perceived efficacy (i.e., the critical point; see Figure 10.2).

For instance, following is a hypothetical example of one person's discriminating value. The items measuring threat and efficacy in the following example range from 1 to 7 (e.g., *not at all susceptible to AIDS* to *highly susceptible to AIDS*; *condoms do not work at all* to *condoms completely prevent AIDS*).

Item Scores for Perceived Threat	
susceptibility item 1:	6
susceptibility item 2:	5
severity item 1:	7
severity item 2:	4
(assign negative value)	−22

Item Scores for Perceived Efficacy	
response efficacy item 1:	2
response efficacy item 2:	1
self-efficacy item 1:	3
self-efficacy item 2:	1
	7

Perceived Efficacy (+7)
− Perceived Threat (−22)
Discriminating Value (−15)

In this example, the threat scores are very high and the efficacy scores are very low. In line with the threat-by-efficacy interactions found in the literature, we would expect fear control processes to dominate, resulting in defensive avoidance or denial. Likewise, the discriminating value equation predicts fear control responses because perceived threat exceeds perceived efficacy, yielding a negative value (i.e., −15) that predicts greater defensive avoidance and/or reactance.

Alternatively, following is an example of a positive discriminating value where perceived efficacy exceeds perceived threat, indicating danger control dominance.

Item Scores for Perceived Threat	
susceptibility item 1:	6
susceptibility item 2:	5
severity item 1:	7
severity item 2:	4
(assign negative value)	−22

Item Scores for Perceived Efficacy	
response efficacy item 1:	6
response efficacy item 2:	5
self-efficacy item 1:	7
self-efficacy item 2:	5
	23

Perceived Efficacy (+23)
− Perceived Threat (−22)
Discriminating Value (+1)

Notice that the threat scores are identical to those in the first example, but the efficacy scores are much higher. Thus both the threat and efficacy scores are high in this example. The literature shows that under conditions of high threat and high efficacy, people adopt recommended responses and protect themselves against a threat (e.g., Kleinot & Rogers, 1982; Maddux & Rogers, 1983; Witte, 1992c). Similarly, the discriminating value equation in this example yields a positive value, indicating that danger control responses, such as attitude, intention, or behavior change, are likely.

It is important to observe that fear control outcomes and danger control outcomes are qualitatively different. Danger control responses include attitude,

intention, or behavior changes; fear control responses include defensive avoidance, message minimization, and/or perceived manipulation (reactance). In other words, positive (danger control) discriminating values predict phenomena that are qualitatively different from those predicted by negative (fear control) discriminating values. With these analyses in mind, the following hypotheses are advanced:

H1. *Danger control responses:* Those individuals with positive discriminating values (indicating danger control dominance) will have higher levels of attitude, intention, and behavior change than will those individuals with negative discriminating values (indicating fear control dominance).

H2. *Fear control responses:* Those individuals with negative discriminating values (indicating fear control dominance) will have higher levels of defensive avoidance, message minimization, and perceived manipulation than will those individuals with positive discriminating values (indicating danger control dominance).

Summary

Risk managers and public health practitioners need diagnostic tools to help determine which types of risk messages will be most effective for targeted audiences. In an extension of the EPPM, I have developed a "discriminating value" formula. This formula should determine whether audiences are engaging in fear control or danger control processes with regard to a given threat or hazard. In the following section, I describe two studies that tested the validity of this formula.

TWO PILOT STUDIES

Two studies were conducted to evaluate the role of perceived threat and perceived efficacy on AIDS-preventive behaviors following the evaluation of an AIDS prevention message. Study 1 assessed perceptions and outcomes at a single time point; Study 2 assessed perceptions and outcomes at two time periods separated by six weeks. Similar questionnaire items were used in both studies.

Methods

Study 1

Procedures. Participants were students who received extra credit or course credit for reading an AIDS prevention message and completing a questionnaire (described below) assessing HIV-related perceptions of threat, efficacy, and outcome variables (e.g., attitudes, defensive avoidance).

Subjects. Participants in the study were 40 primarily heterosexual (97.5%) subjects with an average of 1.5 sexual partners in the previous three months. Most of the subjects were Anglo (60%); 17.5% were African American, 17.5%

were Hispanic, and 5% were Filipino. There were approximately equal numbers of men (52.5%) and women (47.5%), and nearly all of the participants were between the ages of 17 and 24 (97.5%).

Study 2

Procedures. This study was part of a larger project on the role of threat and efficacy in AIDS prevention. After reading an AIDS prevention message, subjects completed an initial questionnaire soliciting perceptions of threat, efficacy, fear arousal, danger control outcomes, and fear control outcomes. Six weeks later, subjects returned to report behavioral changes. To increase the likelihood of honest and accurate behavioral self-reports, the anonymous nature of the questionnaires was stressed repeatedly. Anonymity was ensured by having subjects develop their own secret codes, so the initial questionnaires and six-week follow-up questionnaires could be matched (e.g., "You may use your personal ID code for your ATM, your middle name, or anything else that you'll remember").

Subjects. Participants were 146 prescreened students who were (a) not in long-term monogamous relationships, (b) had had sexual intercourse, and (c) had not taken a course on AIDS or human sexuality. Nearly all of the participants were between the ages of 17 and 24 (93%) and had had an average of 1.4 sexual partners in the previous six months (range 0 to 22). Most participants were heterosexual (97%), and 66.4% were white, 17.8% were Asian, 11% were Hispanic, and 0.7% were African American. Approximately equal numbers of males (45.2%) and females (54.8%) participated. Six weeks later, 115 subjects completed follow-up questionnaires (approximately 21% attrition). Attrition appeared to be random across all demographic variables.

The Questionnaire

Efficacy. The components of efficacy, response efficacy (e.g., "I think that condoms prevent AIDS") and self-efficacy (e.g., "A sex partner[s] and I are able to use condoms to prevent AIDS"), were measured with two items each on scales ranging from *strongly disagree* to *strongly agree.* The efficacy items were averaged to create an overall index (Study 1, $\alpha = .75$; Study 2, $\alpha = .71$).

Threat. The components of threat, susceptibility and severity, were also measured separately. Perceived susceptibility to AIDS was assessed with four items (e.g., "How possible is it for you to get AIDS?"—*not at all possible* to *extremely possible*).[2] In terms of perceived severity, pilot studies indicated a strong ceiling effect for Likert-type responses (e.g., "How serious is AIDS?"—*not at all serious* to *extremely serious*) in that, regardless of the threat condition, most subjects thought AIDS to be extremely serious. Therefore, a two-question "gruesomeness" scale was developed. Participants were asked to rank (a) the *least* to *worst* "way to die," and (b) the *least* to *most* "painful way to die" with the following items: drowning in the ocean, burning to death in a fire, suffocating to death, dying from AIDS, dying from throat cancer, dying from torture, dying

from being buried alive in sand. In computing the results to the gruesomeness scale, whatever the subjects ranked as the worst way to die was assigned a value of 7, the next worst way to die was assigned a value of 6, and so on. Therefore, the scale was a 7-point scale ranging from 1 = *least* worst way to die to 7 = *worst* way to die. Wherever "dying from AIDS" appeared in the rank order of ways to die was the "perceived severity" value it was given. For example, if it was ranked the third worst way to die, it was given a value of 5 for perceived severity. This way, the ceiling effect for perceived severity was successfully resolved (there was variance on the scale), and then this scale was used to validate the low-, moderate-, and high-threat messages. Although this perceived severity measure solved the ceiling effect problem, it contributed to a slightly unstable alpha for the overall threat index (Study 1, $\alpha = .66$; Study 2, $\alpha = .57$).

Danger control outcomes. The danger control (message acceptance) dependent variables were attitudes toward "my using condoms," intentions to use condoms, and self-reported behaviors (Study 2 only). In Study 2, attitudes and intentions were assessed at time 1, and behaviors were measured at time 2.

Attitudes. Attitudes toward condoms were assessed with five semantic differential scales (e.g., bad/good, desirable/undesirable, favorable/unfavorable, not pleasurable/pleasurable, romantic/not romantic) in Study 1 ($\alpha = .90$), and two additional items were added for Study 2 (safe/not safe, effective/not effective; $\alpha = .82$).

Intentions. Intentions to use condoms were measured with five questions (e.g., "Do you intend to use condoms at all during the next 4-6 weeks?"—*definitely no* to *definitely yes*; "I plan to use condoms during the next 4-6 weeks"—*not at all* to *every time I have sex*) (Study 1, $\alpha = .84$; Study 2, $\alpha = .83$).

Behaviors. Behaviors were assessed in Study 2 only at a six-week follow-up with four questions (e.g., "Did you and a partner[s] use condoms?"—*no, never* to *yes, frequently*; "Did you plan to use condoms since you first participated in this study?"—*no, never* to *yes, planned and used them*; "Did you practice any safe sex skills since you first participated in this study?"—*definitely no* to *definitely yes*) ($\alpha = .80$). Only those participants who had had sexual intercourse since time 1 were included in any of the behavioral analyses.

Fear control outcomes. The fear control (message rejection) dependent variables were defensive avoidance, message minimization (only in Study 2), and perceived manipulation, and were solicited with reference to the specific threat (i.e., AIDS) and the AIDS prevention message. Readers will notice that for Study 2, the defensive avoidance and message minimization measures are a bit unstable. It is my belief that these low reliabilities stem from the fact that these variables are "hidden" processes that we cannot directly measure. For example, we can only infer from participant responses that defensive avoidance is occurring (i.e., it is difficult to ask people if they are defensively avoiding a threat, because if they are, they won't know it). Therefore, these measures were validated with thought-listing tasks and a memory test (described in Witte, 1991).

Defensive avoidance. Defensive avoidance was determined through an examination of the degree to which subjects wanted to avoid thinking further about AIDS and AIDS prevention in response to a written message. In Study 1, participants were asked to complete the following with two different responses: "When I was first reading the message and looking at the pictures, my first instinct was to . . . " The two sets of responses were as follows: (a) "*want* to do something to keep myself from getting AIDS"—"*not* want to do something to keep myself from getting AIDS"; and (b) "*want* to protect myself from AIDS"—"*not* want to protect myself from AIDS" ($\alpha = .92$). One additional response item was added to Study 2: "*want* to think about AIDS"—"*not* want to think about AIDS" ($\alpha = .61$)

Message minimization. Message minimization, or denial of the importance of an AIDS prevention message, was determined through the measurement of the degree to which subjects derogated or minimized the message (i.e., feelings and impressions of the message). For example, the message minimization questions assessed whether subjects thought the message was "distorted," "overblown," "exaggerated," "boring," or "overstated" (Study 2, $\alpha = .78$).

Perceived manipulation. The perceived manipulation questions were designed to determine the degree of reactance subjects had against the AIDS prevention message. For example, participants were asked whether they felt "manipulated" or whether the message "deliberately tried to manipulate my feelings" (Study 1, 4 items, $\alpha = .76$; Study 2, 3 items, $\alpha = .66$).

The AIDS Prevention Messages

The messages consisted of (a) a core message based on a public health service brochure, (b) a case study of a fictitious AIDS patient, and (c) a message about the effectiveness of condoms. Four photos were embedded in the core message and the case study. The threat message discussed the severity of AIDS and individuals' susceptibility to AIDS. The efficacy message discussed the effectiveness of condoms in preventing AIDS and the ease with which condoms can be used. To prevent confounding of other variables, each message was equated for length, order of arguments, and number of pictures. Messages and measures were subjected to extensive pilot testing and validation in three phases (for detailed information on the messages, see Witte, 1992c).

Results

Analysis Procedures

The analysis procedures were identical for both studies. First, the threat measure and the efficacy measure were standardized. Then, the discriminating value was calculated in each study as Z-Score Efficacy – Z-Score Threat. Next, those individuals with positive discriminating values were separated from those with negative discriminating values to create a danger control group (Study 1, $N = 20$;

Study 2, $N = 78$) and a fear control group (Study 1, $N = 19$; Study 2, $N = 67$). The hypotheses were tested with MANCOVA procedures because of the multiple dependent variables and the existence of several covariates with the discriminating value as the factor with two levels (positive values = danger control group; negative values = fear control group).

Caveats

I must make one important caveat concerning the results reported here. Because the present work is a first attempt to quantify the critical point in the EPPM, these results should be viewed as preliminary only. These data act as pilot illustrations of what the discriminating value can do, rather than as vigorous hypothesis tests. Because of the exploratory nature of the studies, the *pattern* of results is of more interest than the statistical significance of the results. Future research should examine the discriminating value with diverse topics and populations to test its validity.

Study 1

Danger control responses. As predicted, those people with positive discriminating values (indicating dominance of danger control processes) had higher mean scores for danger control responses than did those with negative discriminating values (indicating dominance of fear control processes). Table 10.1 shows that those people with positive discriminating values had stronger AIDS-preventive attitudes and intentions than did those with negative discriminating values. MANCOVA analysis revealed a marginally significant multivariate effect on attitudes and intentions by discriminating value group (Wilks's lambda = .85, $F[2, 34] = 2.91$, $p = .07$) with number of different sex partners and familiarity of previous sexual partners acting as covariates. Univariate F tests indicated significant differences between the positive and negative discriminating value groups for attitudes ($F[1, 35] = 5.49$, $p < .05$), but not for intentions ($F[1, 35] = 1.66$, $p = .21$).

Fear control responses. As predicted, those people with negative discriminating values (indicating dominance of fear control processes) had higher mean scores for the fear control responses than did those with positive discriminating values (indicating dominance of danger control processes). Table 10.1 shows that those people with negative discriminating values were more likely to defensively avoid the threat of AIDS and to perceive manipulation from AIDS prevention messages than were those with positive discriminating values. MANCOVA analysis revealed a marginally significant multivariate effect on perceived manipulation and defensive avoidance by discriminating value group (Wilks's lambda = .85, $F[2, 29] = 2.55$, $p = .096$) while controlling for the effects of gender, number of different sex partners, and familiarity of previous sexual partners. Univariate F tests indicated significant differences between the positive and negative discriminating value groups for defensive avoidance ($F[1, 30]$

= 4.35, $p < .05$) and marginally significant differences between groups for perceived manipulation ($F[1, 30] = 2.96, p = .096$).

Study 2

Danger control responses. As predicted, those people with positive discriminating values (indicating dominance of danger control processes) had higher mean scores for danger control responses than did those with negative discriminating values (indicating dominance of fear control processes). Table 10.1 shows that those people with positive discriminating values had stronger AIDS-preventive attitudes, intentions, and behaviors than did those with negative discriminating values. Attitudes and intentions (measured at time 1) were analyzed separate from behavior (measured at time 2) because of the discrepancy between sample sizes from time 1 to time 2. MANCOVA analysis revealed a significant multivariate effect on attitudes and intentions by discriminating value group (Wilks's lambda = .92, $F[2, 133] = 5.90, p < .01$) while controlling for the effects of age, prior condom use, number of different sex partners, and familiarity of sexual partners. Univariate F tests indicated significant differences between the positive and negative discriminating value groups for attitudes ($F[1, 134] = 4.98, p < .05$), but not for intentions ($F[1, 134] = .69, p = .41$). When behavior was added as a dependent variable to the MANCOVA, the number of subjects dropped significantly (down to 59) and the univariate F test indicated no significant difference between positive and negative discriminating value groups for behavior ($F[1, 51] = 1.27, p = .26$).

Fear control responses. Those people with negative discriminating values (indicating dominance of fear control processes) had higher mean scores for two of the three fear control responses than did those with positive discriminating values (indicating dominance of danger control processes). Table 10.1 shows that those people with negative discriminating values were more likely to defensively avoid the threat of AIDS and to perceive manipulation from AIDS prevention messages than were those with positive discriminating values. Contrary to predictions, those with positive discriminating values had higher message minimization scores than did those with negative discriminating values. Perceived manipulation and message minimization (measured at time 1) were analyzed separate from defensive avoidance (measured at time 2) because of the discrepancy between sample sizes from time 1 to time 2. MANCOVA analysis failed to reveal a significant multivariate effect on perceived manipulation and message minimization by discriminating value group (Wilks's lambda = .97, $F[2, 116] = 1.86, p = .16$) while controlling for the effects of age, gender, sexual orientation, prior condom use, number of different sex partners, and familiarity of sexual partners. Univariate F tests indicated no significant differences between the positive and negative discriminating value groups for message minimization ($F[1, 117] = 2.18, p = .14$) or perceived manipulation ($F[1, 117] = .54, p = .47$). Similarly, the univariate F test indicated no significant

TABLE 10.1
Mean Responses by Positive Discriminating Value (Indicating Dominance of Danger Control Processes) and Negative Discriminating Value (Indicating Dominance of Fear Control Processes)

	Danger Control Responses			*Fear Control Responses*		
	Attitudes	*Intentions*	*Behavior*	*Defensive Avoidance*	*Message Minimization*	*Perceived Manipulation*
Study 1						
danger control group (positive discriminating value)	5.06	5.15	NM	1.77	NM	2.99
fear control group (negative discriminating value)	4.24	4.70	NM	2.36	NM	3.53
Study 2						
danger control group (positive discriminating value)	5.59	5.68	3.96	2.02	2.39	2.40
fear control group (negative discriminating value)	5.08	5.64	3.63	2.26	2.14	2.53

NOTE: NM = not measured.

differences between positive and negative discriminating value groups for defensive avoidance ($F[1, 87] = .91, p = .34$).

Discussion

The results of these two pilot studies indicate that the discriminating value formula has some predictive utility in determining whether individuals are engaging in danger control or fear control processes with respect to a given threat, in this case AIDS. Thus, in general, the patterns predicted for Hypotheses 1 and 2 were supported although statistical support was weak. As expected, the means of those individuals with positive discriminating values—indicating the dominance of danger control processes—had more positive attitudes toward condoms, intended to use condoms, and reported greater condom use than did those with negative discriminating values. Conversely, the means of those people with negative discriminating values—signifying the dominance of fear control processes—were more likely to avoid defensively and react against AIDS prevention messages (i.e., perceive manipulation) than were those with positive discriminating values. One unpredicted finding was that of message minimization, where the danger control group minimized the message more than the fear control group. It may be that if individuals are controlling the danger of AIDS, then they may minimize any messages coming their way because they believe they are adequately protecting themselves. Future work should examine closely the relations among message minimization, attitude, intention, and behavior change to evaluate whether message minimization tends to be a danger control or fear control response.

Overall, the discriminating value formula yielded patterns that distinguished between those engaged in fear control processes and those engaged in danger control processes. The formula appeared to discriminate between the danger control and fear control groups (with the exception of message minimization in Study 2) across the two separate studies.

Limitations

These results should be viewed cautiously, given that this is a first attempt to provide risk managers and practitioners with an easy-to-use diagnostic formula. As noted above, the *pattern* of the means is of more interest in this chapter than is the statistical significance. Though the discriminating value differentiated between those engaging in fear control and those engaging in danger control, as indicated by the means in Table 10.1, they often failed to reach conventional levels of statistical significance. The discriminating value formula should be tested in large-scale correlational studies to determine more fully its predictive validity. Readers also should note that the discriminating value formula simply offers a rough cut between those currently engaged in danger control processes and those currently engaged in fear control processes. Unfortunately, the current formula does not offer any further precision than this. However, the formula

offers important information to risk message designers in that it can be useful for them in diagnosing, a priori, the likelihood of their fear appeals' pattern backfiring. Overall, the results for the formula are encouraging, given the consistency of the findings across two studies and two samples. Future studies should utilize randomly sampled populations to test the ideas presented here.

Practical Applications

The discriminating value formula appears to distinguish between those engaging in danger control processes and those engaging in fear control processes. This user-friendly discriminating value formula has great practical utility and offers practitioners an easy method for determining what type of fear appeal to use. For example, the results of the two studies reported here suggest that when danger control processes dominate, fear appeals targeted toward these populations should focus on both the threat of HIV for college students and the efficacy of recommended responses to avert HIV transmission. Focusing on the threat of HIV while also depicting effective and easy methods to prevent transmission should elicit protection motivation and result in safer sex behaviors among these sexually active, nonmonogamous, heterosexual individuals. Of course, for those currently engaging in fear control processes, the fear appeals would need to focus on ways to deter HIV transmission and omit any references to the threat. When fear control processes dominate, perceived threat is already too high. Thus risk messages targeted toward those engaging in fear control processes should especially emphasize response and self-efficacy issues. Future research should explore which groups of people tend to engage in danger control processes and which groups tend to engage in fear control processes with a variety of health threats (e.g., lung cancer, automobile accidents, heart disease).

USING THE EPPM TO GENERATE RISK MESSAGES

The EPPM has the capacity to be expanded and applied to the area of risk communication, given its focus on how risks induced by perceptions of threat interact with how perceptions of efficacy or control over a hazard produce either danger control or fear control outcomes. Previously, many in the risk field have considered fear appeals to be inappropriate strategies for gaining adherence to risk communication recommendations. For example, Covello, von Winterfeldt, and Slovic (1986) assert that "people seldom respond appropriately to high-threat or fear communications, such as photographs or films graphically depicting the physical symptoms of disease or the results of a disfiguring or fatal accident. Such communications may induce excessive fear and anxiety, which, in turn, may reduce people's attention, induce defensive responses, and evoke hostility toward the source of the communication" (p. 175). The operative word in this

quotation is "may." Risk communications *may* initiate adverse outcomes such as those outlined here, but only under certain conditions, according to the EPPM. When people feel out of control or helpless in the face of a grave threat, they are more likely to react against the risk message and control their fear by defensively avoiding the risk or by becoming angry at the communicator for using blatant manipulation techniques. However, high-threat messages can be extremely effective in motivating self-protective behaviors *if* people believe they can easily and effectively avert the threat (e.g., see Kleinot & Rogers, 1982; Rogers & Mewborn, 1976; Witte, 1992c).

Experts on emergency management for natural and technological disasters have long pointed out that an effort "must be made by emergency managers to establish a clear relationship between taking the suggested protective measures and the minimization of negative consequences of the hazard. Any imminent-threat message should explain *how* public safety will be enhanced if citizens comply with these instructions" (Perry & Nigg, 1985, p. 76). Thus, common wisdom matches empirical and theoretical conclusions. That is, risk messages must not only depict the threat as severe and probable; to promote danger control responses, they *must* offer specific solutions that the public can easily carry out with a minimum of complexity and labor. For example, in the case of a natural hazard, public response to risk messages is more likely if the information about averting harm "is specific regarding the hazard. . . . Specific information is more likely to be believed, as is information that is consistent, certain, frequently delivered, from official sources, and then confirmed" (Mileti & Fitzpatrick, 1992, p. 394).

Too often, it appears that risk messages contain information about the threat only, with no information (or information given too late) about how to avert harm from or minimize exposure to the threat. Unfortunately, when no information is given about how to avert and/or minimize the threat (i.e., no efficacy information is given), people are more likely to engage in fear control responses. One way to increase perceived efficacy in order to promote danger control responses in the face of a serious threat is to increase the public's perception of individual control. For example, the consistent release of information (as it comes in) about particularly threatening or alarming risks can act as a safety valve, in that people feel informed and in control; their efficacy is increased because they believe they know what to do if the threat should become actual, and perceived threat is adequately balanced by perceived efficacy. In such a case, people are able to remain cognizant and rational as they believe in their ability to control the danger. If information about a threat is withheld, people's perceived efficacy in averting any harm from the threat is low. They feel uninformed and unsure of what to do if the threat becomes real; perceived threat exceeds perceived efficacy, resulting in fear control responses, where people react against risk managers and lash out at them. "Withholding information angers people, in part because they lose their power to take action. By withholding information, even in cases where exposure is minimal, agencies pre-empt people's right to make decisions

and control their exposure to risk" (Chess & Hance, 1989, p. 14). Similarly, Devgun (1991) notes, "To avoid the perception of involuntary risk thrust upon them, the local public needs to be involved throughout the remediation process and should be a partner in the decision-making process" (p. 7).

When individuals' levels of perceived efficacy remain high—that is, when they believe they know what to do and believe they are able to do something to avert a threat—they will engage in danger control processes, even in situations of high threat. For example, in one potentially threatening situation involving private wells that needed to be tested for contamination, "people were alerted to each step of the process before it happened. As a result, discussion centered on the risk itself and not on the way people were treated by the health department" (Chess & Hance, 1989, p. 14). Because perceived threat was balanced by perceived efficacy, the public engaged in danger control responses.

When threatening information about a risk is released all at once, people are overwhelmed emotionally because they feel a lack of control (i.e., low perceived efficacy) in the face of a grave threat (high perceived threat) and engage in fear control responses, lashing out in anger at risk managers and/or reacting emotionally (as one grassroots activist stated, "I got into it because of my kids. I *stayed* in it because I got so angry"; Chess & Hance, 1989, p. 14).

In sum, to prevent fear control responses and to maintain danger control responses, risk managers should (a) work *with* communities and listen to and address their concerns, (b) keep people informed of risks and hazards as they emerge, and (c) involve the public in decisions and the development of regulations (Chess & Hance, 1989). By doing these things, risk managers can balance perceptions of threat—however high they may be—with perceptions of control over the threat (i.e., high perceived efficacy), and danger control processes should dominate. The EPA's recent protocol for developing risk communications includes getting community input on the management of risks (Thomas, 1986). By doing this, risk managers can ascertain levels of perceived threat and fear as well as levels of perceived efficacy in averting any risks. They can then develop messages, based on the assessment of community perceptions, that yield the maximum level of understanding and effectiveness.

ETHICAL ISSUES IN RISK COMMUNICATION

The development of risk-related messages often presents ethical dilemmas concerning choices between simply informing the public and persuading the public to act or react. Risk messages can inform, educate, and promote and/or direct behavior (Covello et al., 1986). However, *any* risk message, by virtue of presenting certain facts to the exclusion of others (because of time or other constraints), will influence its audience in some manner. There is no such thing as a neutral risk message. As Cannell and Otway (1988) note: "The only satisfactory solution to this dilemma is for those engaged in risk communications consciously to

serve the information needs perceived by their audience, whoever that audience happens to be and in whatever context it finds itself. This implies a commitment to people, rather than technology" (p. 524).

Risk influence messages appear to be most acceptable when they promote better health and/or the prevention of disease (National Research Council, 1989). For example, risk messages that persuade persons to quit smoking cigarettes, to wear seat belts, to use condoms to prevent transmission of HIV, or to seek mammograms to detect cancer are traditionally seen by the government and the public as appropriate. It appears that "when a class of personal action (such as drunk driving) affects a large portion of the populace or threatens individuals who do not engage in that action, people are more willing to accept, and even to demand, that government agencies be proactive and try to influence beliefs and actions. Under such conditions, people are more willing to compromise the autonomy, privacy, or freedom of some individuals for the good of others" (National Research Council, 1989, p. 89). Also, "the more clearly it has been established that an activity is dangerous or that it may harm persons generally considered to deserve societal protection (e.g., children), the more acceptable influence attempts seem to become" (National Research Council, 1989, p. 88).

The EPPM provides a theoretical rationale and specific procedures for manipulating risk perceptions of audience members in order to motivate them to act or react in the manner desired by message designers. However, policy makers and risk managers must behave ethically, with the common good in mind, when designing risk messages. Clearly, the "good of the masses" must come before the "good of the agency." Obviously, target audiences should not be persuaded that a risk is safe and acceptable when in fact it is not (or we do not know whether it is safe or not). Even if the "true" risk of a hazard is unknown, risk managers can prevent panic in audiences by (a) acknowledging this uncertainty (which is likely to increase perceptions of threat) and (b) offering specific steps that people can take to reduce effectively the chances of the threat occurring and/or to minimize harm from the threat should it occur. For example, there is great uncertainty in exactly how many ways HIV can be transmitted, which results in strong perceptions of threat about HIV transmission. However, the known strategies for reducing the chances of contraction of HIV can be spelled out in a step-by-step manner to reduce public fears. In short, risk message designers must be ethical, responsible, and committed to the general welfare of the audience. The tremendous responsibility attached to deciding the "right" answers or the "correct" behaviors cannot be ignored.

CONCLUSION

Although risk messages, and especially fear appeals, have great potential for promoting self-protective behaviors, until now there has been no way to determine *prior* to message development *which* kinds of messages will be most

effective for targeted audiences. The formula I have described in this chapter represents one relatively simple method for determining appropriate messages for specific audiences. The results of the pilot tests reported here reveal that the formula may be useful as a diagnostic tool for public health practitioners and risk managers interested in devising effective targeted risk communications that yield the greatest public good.

NOTES

1. Originally, Fischhoff et al. (1978) labeled the two factors "technological risk" and "severity." In later work, these researchers reexplored the factor structure, which resulted in a shifting of some of the qualitative dimensions and the renaming of the two factors to "dreaded" and "unknown risk" (e.g., Slovic, 1987; Slovic et al., 1982).

2. Susceptibility did not receive disproportionate weight in the perceived threat index even though it was measured with four items and severity was measured with only two. First, separate composites were developed for perceived susceptibility and perceived severity, then these composites were averaged to create the perceived threat variable.

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