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### Risk

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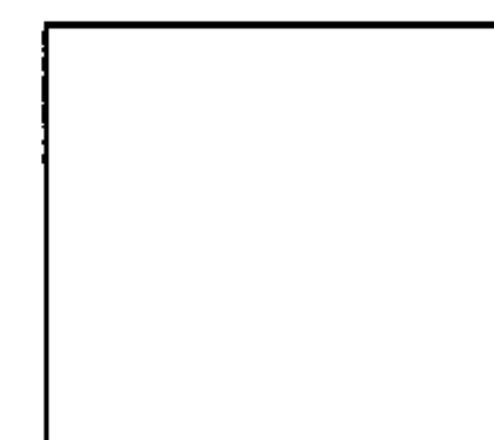
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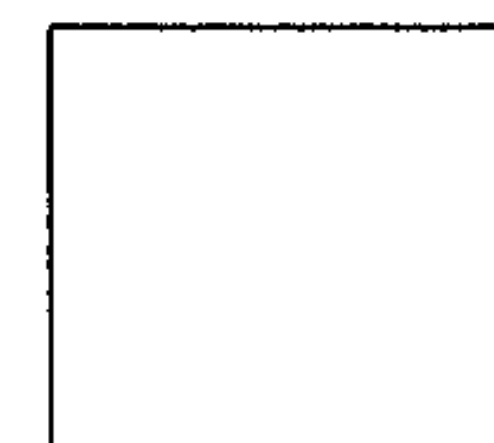
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MICHAEL BILLIG

**risk** The perception of risk and the acceptability of risks have been studied extensively in psychology. A formal definition of risk is the likelihood or probability  $p$  of the negative event or consequence  $i$  multiplied by the negative value or utility of that event or consequence  $u_i$ . If a negative event is characterized by multiple negative consequences, risk could be defined as  $\sum_i p_i u_i$ .

This definition more or less coincides with dictionary definitions of risk; "the possibility or chance of loss" is a frequently given definition. Other examples are: "hazard or danger" and "exposure to mischance or peril." Although there is quite some disagreement about the precise definition of risk among scientists, the many different risk definitions are clearly related to the above general meaning of risk. In medicine and epidemiology, risk is the chance of a specific adverse outcome such as death or the contraction of a particular disease. The risks of technological developments such as the use of nuclear power for generating electricity are often defined in terms of the chance of excess deaths per reactor-year. In the literature on economics opportunities whose returns are not guaranteed are commonly described as "risk."

Potential negative outcomes are sometimes quantified (e.g., financial loss, number of possible victims). However, quantification of outcomes is often difficult and uncertain. Risk also implies that there is uncertainty about the outcomes of actions. There are different ways in which uncertainty can affect risk (see Yates, 1992). Sometimes risk is said to exist whenever the (negative) outcomes of an action are not assured. Second, quite often decision makers are unable to foresee every significant consequence or outcome of their decision. This uncertainty concerns the relevant attributes or consequences that should

be taken into account. Third, even if one accepts that specific negative consequences can occur, there is still uncertainty about whether these consequences will occur. Fourth, it is necessary to distinguish different "levels of uncertainty"; i.e., the firmness of the basis on which the probability of the negative consequence is estimated. The continuum of uncertainty levels ranges from ignorance (no basis whatsoever for estimating probabilities) via frequentistic probabilities (previous experience as the basis for estimating probabilities) to objective probabilities (e.g., if one decides that out of a group of five, one person will be selected by lot to be the spokesperson, the chance of any one of the group being selected is 1/5). The quality of the database for frequentistic probabilities can vary substantially (e.g., a handful of experiences versus epidemiological findings based on large samples). Yates (1992) argues that there is considerable (often implicit) agreement about a fundamental conception of risk. He mentions three essential risk elements:

- (1) negative consequences or losses;
- (2) the value or significance of these losses; and
- (3) uncertainty associated with these losses or consequences.

Individual risk behavior has been studied in the area of DECISION MAKING. As a part of this area PROSPECT THEORY describes the effects of framing on preference for risky versus cautious alternatives in choice situations. Two themes have dominated social psychological research on risk. First, perceived risk and the acceptability of risk have been studied extensively in the context of large scale hazards such as nuclear power, environmental pollution, and a variety of technological developments with possible adverse consequences for the environment and public health. A second theme concerns individual risk-taking behavior. Research on these more personal risks often concerns risks for one's health. Thus, the second theme of this section will focus on the perception of health risks and its relation to risk-taking behavior.

#### PERCEIVED RISK AND ACCEPTABILITY

Generally, people have difficulties in understanding probabilistic processes. Sometimes



uncertainty is simply denied, sometimes it is misjudged and often one is overconfident about one's judgment. Interestingly, experts appear to be prone to many of the same biases as lay people, especially when they cannot rely upon solid data. Initially, research on risk perception attempted to develop a taxonomy of hazards in order to understand public responses to risks and why some hazards led to extreme aversion and others to indifference. Furthermore, it was hoped that the findings would also help to explain the discrepancies between public reactions and the opinions of experts. One of the major conclusions of this research is that the public is much more likely to accept risks from *voluntary* activities as compared to *involuntary* activities. Voluntary risks which are up to 1,000 times greater than involuntary risks with the same level of benefits, tend to be seen as equally acceptable. Another paradigm in this research is to ask subjects to give their subjective estimates of the frequency of death from a variety of sources or activities (e.g., nuclear power, hang-gliding, different illnesses and accidents) for which objective estimates are available. This research defined risk as annual deaths per activity.

Results show that people are approximately accurate, but that their judgments are systematically distorted (*see* Fischhoff et al., 1981). Overall, data suggested that people have a relatively consistent subjective scale of frequency. Furthermore, their judgments correlate fairly well with available statistical estimates. Responses also indicate a number of shortcomings. One is that differences between the (subjective) judged frequencies of the most and least frequent sources or events are considerably smaller than the corresponding differences in the objective, statistical estimates; i.e., larger risks are underestimated and smaller risks are overestimated. A second bias, AVAILABILITY, results in large differences in the estimated frequency of events with similar statistical frequencies. People who use this HEURISTIC judge an event as likely or common if instances of it are relatively easy to imagine or recall. Frequently occurring events generally come to mind more readily than rare events. Thus, quite often availability is an appropriate cue. However, it is

also affected by numerous factors unrelated to frequency of occurrence. For example, a recent air crash or train disaster can have substantial distorting effects upon risk judgments. Generally, overestimated frequencies tend to be dramatic and sensational whereas underestimated risks are related to less spectacular events that claim one or a few victims at a time and are also common in nonfatal form. Not surprisingly, overestimated hazards also tend to be disproportionately mentioned in news media. To summarize, lay people can assess annual fatalities if they are asked to, and generally produce estimates with the same general rank ordering as the existing statistical estimates. It seems, however, that their judgments of "risk" are related to other characteristics, such as dramatic impact and newsworthiness which results in increased psychological availability of the risk.

Experts' judgments of risk differ systematically from those of nonexperts. Experts' risk perceptions correlate quite highly with technical estimates of annual number of fatalities; their perceptions also reflect the complete range, from high to low risk. Lay people's perceptions of risk, however, are compressed into a smaller range and do not correlate as highly with annual mortality statistics.

A further line of research attempted to relate perceived risk to other characteristics such as familiarity, perceived control, catastrophic potential, equity, and level of knowledge (*see* Fischhoff et al., 1981). In these studies subjects were asked to judge a large number of technologies and risk-bearing activities on dimensions such as "voluntary-involuntary," "chronic-catastrophic," "common-dread," "not fatal-fatal," "known to exposed-not known to exposed," "immediate-delayed," "known to science-not known to science," "uncontrollable-controllable," and "new-old." The "risk profiles" derived from this research showed that a technological hazard such as nuclear power scored at or near the extreme high-risk end for most of the characteristics. Its risks were seen as involuntary, unknown to those exposed or to science, uncontrollable, unfamiliar, potentially catastrophic, severe, and dreaded. These characteristics can be condensed into a small set of higher-order characteristics. The



ratings can largely be explained by two higher-order factors. The first being primarily determined by the characteristics "unknown to exposed" and "unknown to science," and to a lesser extent, by "newness," "involuntariness," and "delay of effect," while the second is defined by severity of consequences, dread, and catastrophic potential. Controllability contributes to both factors.

This research has helped to clarify structural aspects of the perception of technological risks and helps us to understand public reactions and predict future acceptance and rejection of specific technologies. An obvious case in point is nuclear power. The public's view about nuclear power risks is that these are *unknown, dreaded, uncontrollable, inequitable, catastrophic, and likely to affect future generations*. People's strong fears about nuclear power seem logical consequences of their concerns about these considerations. Furthermore, it seems likely that accidents occurring with unknown and potentially catastrophic technologies will be seen as indicative of our loss of control over this technology (*see also* Van der Pligt, 1992).

#### PERCEIVED RISK AND RISK-TAKING BEHAVIOR

Increased knowledge of the possible health consequences of behavioral practices has led to a situation in which a wide range of behaviors have been labeled as risky. As morbidity and mortality have come to be related more to chronic conditions which are tied to lifestyle and behavior, there has been a significant increase in research attempting to understand these behaviors and to help design behavioral intervention programs.

Several theoretical models have been proposed to examine health-related behaviors; these theories are generally based on more general theories of decision making and risk taking. Another source of these models is the THEORY OF REASONED ACTION. These models all incorporate the concept of perceived risk. For instance, the Health Belief Model (Janz & Becker, 1984) states that an individual would be prepared to undertake preventive behavior(s) as a function of his or her percep-

tion of the severity of the threat, the perceived benefits of the recommended health action, and the perceived barriers to taking the action. Protection Motivation Theory (Rogers, 1975, 1983) focuses on cognitive appraisal processes in response to messages about health risks that induce fear. This theory also includes factors such as the perceived severity of the health threat and perceived vulnerability or susceptibility.

Both models deal with perceived risk. Unfortunately, individuals are not always accurate judges of their risk. One pervasive bias in people's judgments regarding their own risks, or susceptibility to negative health effects, is called unrealistic optimism (Weinstein, 1988). This optimism could reduce the effectiveness of health education programs that are intended to warn people about specific health risks and to persuade them to change risky behaviors or lifestyles. Weinstein argued that people tend to think they are "invulnerable"; others are more likely to experience negative health consequences than oneself. Each individual could be right in assuming that his or her risks are smaller than those of comparable others. However, if most people in a specific group rate their risk below average, a substantial part of them must be wrong or "unrealistic."

Six possible causes have been mentioned in the literature on unrealistic optimism. A first factor is *perceived control*: When rating one's own risk status as compared to others, optimism tends to be greater for those risks judged to be under personal control. Findings also indicate that for any specific health risk those who rate its controllability higher are more optimistic. This relation between perceived controllability and optimism is confirmed by research on risk appraisals in a wide variety of health-related domains.

A second factor that could be related to optimism is the so-called *egocentric bias*. When people are asked to assess their risks and those of others, they are bound to have more knowledge about their own protective actions than those of others. It seems that people tend to focus on risk-reducing actions while they tend to forget personal actions or circumstances that increase their risks. Moreover, one's



own actions are more available than those of others; i.e. one simply forgets that most other people also take protective action. This bias is also related to cognitive availability. We simply have more knowledge about our own precautionary actions than those of others.

Third, lack of previous *personal experience* tends to increase unrealistic optimism. Personal experience tends to be relatively vivid (see VIVIDNESS) as compared to statistical information about risks, and enhances both availability and recall. Possible negative consequences for health and well-being that have been experienced more directly tend to result in less optimistic risk appraisals.

A fourth factor that could produce unrealistic optimism is related to *stereotypical or prototypical judgment*. People might have a relatively extreme image of those suffering from specific diseases. This extreme prototype is unlikely to fit one's self-image, hence it is concluded that the risk does not apply to oneself but primarily to others.

A fifth factor is *SELF-ESTEEM maintenance* or enhancement. Generally, people seem to think that their own actions, lifestyle, and personality are more advantageous than those of their peers. This mechanism would explain the fact that people are generally not optimistic about hereditary and environmental health-risks, for the latter do not constitute a threat to one's self-esteem. In contrast, a high-risk lifestyle could be seen to imply that we are ignorant of what we ought to do or are simply unable to exercise self-control. These factors concern a person's ability to cope effectively with life demands and have clear links to self-esteem.

The sixth and final factor is related to *coping strategies*. Under conditions of high stress or threat, denial is a response often used to protect against anxiety or worry. Denial can reduce emotional distress but can also reduce the likelihood of direct behavioral actions, which may be necessary to reduce one's risks. Unrealistic optimism is an illusion that can help the individual to adapt to threatening events. The issue of how people cope with risks which are seen as a threat and which induce anxiety and stress is addressed in more detail in the following section.

#### RISK, THREAT, AND COPING

Information about risks to one's health can be threatening and relatively stressful. Janis and Mann's (1977) conflict theory provides a model of how stress caused by decisional conflict can affect decision making. The heart of their theory is an analysis of basic COPING patterns which are used to deal with intraindividual conflict and stress. These five patterns are unconflicted inertia, unconflicted change to a new course of action, defensive avoidance, hypervigilance, and vigilance. Conflict theory uses the term "risk" in its common, everyday meaning of "exposure to the chance of negative outcomes." Conflict is expected to be aroused whenever the person recognizes that there are serious risks arising from existing and/or new behaviors. This elicits feelings of anxiety and emotional stress. The three coping patterns commonly associated with decisional conflict and stress are defensive avoidance (which is generally assumed to take three forms: procrastination, shifting decision responsibility to others, and rationalization); hypervigilance (immediate and impulsive choice which is unstable and characterized by a high rate of vacillation); and vigilance (which refers to relatively careful, deliberate choice). Each of these three coping styles is associated with a distinctive level of stress. Defensive avoidance is related to variable stress levels as a function of the salience of the threat, hypervigilance is associated with extremely high levels of stress; while vigilance is generally associated with moderate levels of stress. Conflict theory relates levels of stress to the quality of information processing and decision making, with less adequate decision making being associated with maladaptive coping styles such as defensive avoidance and hypervigilance. Protection motivation theory also distinguishes between adaptive (e.g., rational problem solving) and maladaptive coping styles (e.g., avoidance, wishful thinking, fatalism, hopelessness). These distinctions are of importance in the context of risk communication and health education programs aiming to encourage people to change risky behavior. It seems essential that such programs increase people's awareness of specific risks but within certain limits. Programs that induce



fear (*see* FEAR APPEALS) could induce high levels of stress which in turn could hinder behavioral change due to maladaptive coping styles such as defensive avoidance and hyper-vigilance.

Stress can also play a role in the context of technological risks. Information about technological risks can be threatening and lead to anxiety and stress. This is especially the case with large-scale disasters such as nuclear and chemical accidents. A major nuclear accident at Three Mile Island (USA) in 1979 resulted in a series of longitudinal studies. This research showed that the uncertainty about health risks and the economic future of the region resulted in increased stress levels for local residents. This research also showed the relevance of coping styles. Emotionally focused coping was associated with less stress than problem-focused coping and denial. In other words, local residents who chose to attend to their emotional response (focus inward and attempt to control fears and related responses) experienced less stress than people who focused on the source of stress in order to reduce or remove the threat that was posed. In extreme circumstances such as large-scale disasters, the situation is difficult for individuals to change and the realization of the necessary changes by the responsible agents (e.g., a local authority, national government or a specific firm) usually takes a long time. Due to the low controllability of the possible negative consequences, problem-oriented coping styles (such as vigilance) seem to be less effective in these circumstances.

#### CONCLUSIONS

Risk plays an important role in our lives. Research on the perception of risk has shown that people are reasonably adequate judges of many risks. Their perception is also biased, however. The availability heuristic is one of the distorting factors. Acceptability of large-scale technological risks seems to be primarily determined by qualitative characteristics of these risks such as the severity of the consequences, catastrophic potential, the novelty of the risks and low perceived controllability. People's perception of personal risks of their own behavioral practices follows a different

pattern. Generally, people seem rather optimistic about personal risks, an illusion that could reduce the need to take preventive action. Finally, approaches that incorporate stress and coping responses to risks that pose a serious threat could help to improve our understanding of public reactions to these risks.

*See also:* DECISION MAKING; HEURISTICS; PROSPECT THEORY; SELF-ESTEEM; STRESS AND COPING.

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JOOP VAN DER PLIGT

**role theory** This theory builds on ideas rooted in a theatrical metaphor: Social life proceeds as performances by actors in a drama. There are various role theories. All hold that persons occupy different locations in organized social life; particular NORMS, BELIEFS, and ATTITUDES attach to varying social locations, for both persons in those locations and others not themselves in the