

Communicating Science-Based Information about Risk: How Ethics Can Help

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Risk science (or scientific risk assessment) is research conducted to ascertain *what* untoward or unwanted events might occur in connection with a given course of action (usually one involving a technical practice such as drug development or nuclear power), as well as the *likelihood* that these untoward and unwanted events will actually transpire, given specifiable contingencies. Risk communication is a contested activity conceived originally in terms of making the findings of risk science generally available to the public, but adjusted to include efforts for bringing public concerns and knowledge into the activity of risk science (Priest, 2009). The aim of this chapter is to survey two important points of intersection between the communication of scientific or science-based findings on risk and social ethics. The first concerns a conceptual bias common to most scientific risk assessments that leads communication efforts to emphasize one general class of ethical norms at the expense of others. The second involves a grammatical bias that puts scientific communication efforts at odds with common ways of speaking and writing about risk taking and risky situations. The chapter thus takes on a somewhat limited subset of the topics that a broader survey of ethical issues associated with risk assessment might encompass (see Cranor, 1990; Hansson, 2007).

Ethics: A Brief Clarification

Philosophers and other scholars who work in and on ethics are familiar with a number of ways in which their topic confuses and puzzles their audiences.

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Some of this mayhem can be traced to the very grammar of the word “ethics.” Ethics (noun plural) are norms, standards, and expectations that circumscribe, direct, and possibly motivate conduct appropriate for a given situation. Among professional groups, ethics (p.) specifies rules or codes for practices thought to be essential for or peculiarly characteristic of the profession. They may be articulated by a list of standards that stipulate types of behavior for specific situations, or by principles that prohibit conduct deemed to be inconsistent with professional norms. For example, the code of ethics for professional appraisers forbids someone who makes an appraisal for a fee from offering to purchase the item being appraised. Ethics (p.) also indicates tenets or canons applicable in common life: “don’t tell a lie,” “always be courteous.” Here, ethical expectations are frequently communicated through stories or the celebration of iconic individuals (heroes and villains) in a manner that does not easily translate into imperatives indicating specific actions. Journalistic ethics, for example, might be promulgated by rules such as “Always tell both sides of the story” or by reference to an individual (such as Edward R. Murrow or Katharine Graham) whose conduct was thought to exemplify good ethical character.

Ethics (noun singular) is a domain of discussion, discourse, and theory devoted to the critical analysis of both individual and social conduct. In academic circles it is sometimes characterized as a subfield of philosophy, though academic programs in ethics have tended to be interdisciplinary. Sociological studies in ethics, for example, often undertake empirical work to identify the norms, value judgments, and opinions about ethics (p.) that are most widely shared in a given social group. Philosophers and practitioners of ethics (s.) may be engaged in a critical debate whose purpose is to forge agreement on what actions should be undertaken in a given context, as distinct from those actions and practices that typically *are* undertaken. There may also be discussion, discourse, and theory devoted to more general structural, logical, and psychological dimensions of ethics (p.). *Ethical theory* is an attempt to derive a very general set of prescriptive procedures that identify right actions, while *metaethics* is an attempt to characterize the nature of morality and ethical conduct without necessarily offering any basis for prescriptive judgment.

However, ethics (p.) and ethics (s.) are not fully distinct. On the one hand, as already noted, key aspects of ethics (s.) involve the empirical study of ethics (p.). Attempts to formulate ethical theories or complete metaethical analyses are increasingly informed by these empirical studies (Appiah, 2008). On the other hand, there are often situations in which commonly accepted norms either conflict or do not fully specify the conduct that is demanded of people who wish to act in an ethical manner. In such situations, the form of critical inquiry typical of ethics (s.) may help the person or persons choose

which of several courses of action are appropriate. Similarly, circumstances can arise in which large scale cultural, organizational or group change calls for widespread reexamination of traditions, habits, and norms. Transitions associated with changing views on gender, race, and sexuality have led to extensive ethical debates in recent years, and these debates are widely understood to have practical as well as scholarly significance.

The following discussion of ethics and scientific risk communication is more typical of ethics (s.) than ethics (p.). There is no attempt to specify rules or standards for the practice of risk communication. Rather, the goal is to expose how ethical assumptions penetrate deeply into the way that risk itself is conceptualized, shaping the formulation of risk analysis and risk management in particular situations. The thesis is that the practitioners in scientific risk assessment and communication efforts that emphasize scientific findings on risk have often foundered (sometimes badly) in ways that can be illuminated by ethics (s.). In some cases, they have implicitly made normatively biased framing assumptions while in others they have adopted conceptualizations of risk that are naively oblivious to ambiguities in the way that the word "risk" functions grammatically. Either way, my thesis presumes that speakers of English possess a broad competency for using the word "risk" in ordinary conversation. Speakers of English use the word "risk" along with related grammatical forms, such as the adjective "risky," the adjectival nominative "riskiness," or the gerund "risking," with the fluency characteristic of a native speaker. Native speakers are considered to have authoritative opinions about the meaning of words in their native language due to a natural acquisition process that cannot be matched by those who learn the language later in life. Native speakers will not necessarily be able to articulate grammatical rules for the language, but will have an intuitive understanding of grammar through their experience with the language (Love & Ansaldo, 2010). The concept of risk is circumscribed by the meanings that can be derived from this usage. As will be shown below, these grammatical forms associate the concept of risk with ethical content: They typically convey a value-orientation toward the conduct or events that are described as risks or as risky.

However, as will also be discussed below, the precise nature of this value orientation varies from one context to another. Such variance in ethical content is normally unproblematic in ordinary conversational usage, because context resolves the potential for ambiguity. People can generally follow a conversation about risk much more readily than they can follow the definition and distinction-drawing that are typical of work done by philosophers. What is true of people in general is often true of disciplinary specialists who have not been socialized into the peculiar obsession with consistency and linguistic precision that is typical of academically trained philosophers. There is thus some

risk (no irony intended) that readers will find the analysis that follows pedantic, boring, and unengaged with the concerns of science communication. But what is true of philosophical discourse is also true of science-based risk communication. In contrast to the general concept of risk that unifies usage among contemporary speakers of English, a specific conception of risk is developed in scientific risk assessment, where a given methodology or problem solving task has been presupposed (Thompson & Dean, 1996). For example, financial analysts and epidemiologists are both highly conversant in risk problems, but it is clear that they conceptualize risk in very different ways. Not only are the outcomes (financial loss vs. epidemic disease) quite distinct, financial losses are incurred by the individual or corporate entity whose assets were "at risk," while the epidemiological conception of risk relates observed outcomes to a general population. Given their methodological orientation, some epidemiologists insist that risk is definable only in reference to populations, but taken literally such a statement implies that financial analysts who discuss the risk of a particular investment decision simply don't know what they are talking about!

It is uncontested that specific conceptualization of risk are necessary for specific research, technical, decision, and analytic activities. It is also a commonplace of science communication that experts are advised to maintain cognizance of the way in which their specialized knowledge may not be shared by the larger public. Yet it is a thesis of this chapter that this commonplace is not fully appreciated with respect to expert conceptions of risk and the communication of science-based information about risk to the larger public.

Ethical Issues in Risk Assessment

The recent history of contested technologies exhibits a persistent tension between the perception or estimates of scientifically trained experts and the risks associated with these technologies by the lay public. In an early and frequently cited article Judith Bradbury draws a distinction between a technical community of risk experts who presume that risks are objective features of the world, and a second community of experts in the social and behavioral sciences who presume that risks emerge as a blend of perception, culture, and the social situation of parties who experience risk. Experts in the technical group presume that risk is fully described by two discrete quantities. The first is a scientific account of some phenomenon or state-of-affairs, and the second is the probability or likelihood that this phenomenon or state-of-affairs will occur. Experts in the second group are more likely to view variation in a given person's state of knowledge, their values about what matters, and more conventional social variables such as race, class, and gender as relevant to

risk. Bradbury wrote that experts in the second group believe that risks are sociocultural constructions (Bradbury, 1989).

My own approach differs from Bradbury's "social construction" in two respects. First, as this chapter will discuss at some length, language conventions place boundaries on experts' ability to specify technical conceptions of risk that go well beyond the influences of race, class, and gender or of divergent values. This is not to imply that racial, class, and gender biases are absent from the way that either experts or lay publics conceptualize risk nor to deny that such sources of bias raise ethical issues. They are just not the issues that are the primary topic of this chapter. Second, the term "social construction" has plunged risk communication into a difficult ontological debate. On some readings, social constructions are free-floating cultural artifacts that are to be sharply distinguished from "real things" that are amenable to scientific research (see Hacking, 2001). By the end of the 1990s, risk scholars were writing about "the risk wars," implying that there were two antagonistic schools of thought founded on wholly distinct concepts of risk. Natural scientists held that risks are "real" and amenable to the methods of the biophysical sciences, while social scientists in the social constructionist school of thought were most responsible for bringing communication studies to the forefront, especially the so-called Orange Book. This National Research Council Report (entitled *Understanding Risk*) emphasized a number of ways in which lay publics faced challenges in understanding the quantifications of risk typical of the technical community. The report also took the technical community to task for neglecting legitimate concerns of lay publics that were not easily incorporated into the probabilistic approach to risk (Slovic, 1999).

This way of interpreting the field of risk studies would leave anyone attempting to address problems in risk communication in something of a quandary. Does one presume that technical experts have it right, making the job of risk communication one of translating technical results into more understandable language? Or does one follow a line of thought that suggests lay people can have important input into risk assessment, making risk communication into an activity of translating from lay publics to technical experts? The possibility that both roles are legitimate was obscured by the tendency to interpret the two schools of risk as arising from incompatible conceptual paradigms. Elsewhere I argue that while experts in biophysical and social sciences may indeed have distinct conceptions of risk, it would be erroneous to presume that non-expert members of the public are "contextualists" or "social constructionists" whose understanding of risk matches that of the social scientists, rather than the technical experts (Thompson, 1999).

The native speakers I will regard as authoritative sources on the meaning of risk would be as mystified by talk of social construction as they would be by the detailed statistical models of epidemiologists. The distinction I will emphasize below is between *any* expert conception of risk (including those based in the social and behavior sciences) and a general concept of risk that underwrites ordinary conversational uses of the word "risk."

Risk Science and Ethical Bias

Although philosophers have developed many approaches to the theorization of ethical conduct, two patterns of thought were especially influential in the twentieth century. Utilitarian ethical theories define right action as a function of the consequences or outcome produced or caused by it. Kantian, Neo-Kantian, or deontological ethical theories (henceforth simply Kantian) define right action according to its conformity with rules and without regard to outcomes. Although there are numerous difficulties in both approaches, my focus here concerns the way that risk is implicated within and addressed by each approach. Both assume that the function of an ethical theory is to dictate which of numerous possible actions is ethically correct. They are designed to address a choice situation in which a decision maker explicitly and deliberatively considers what should be done.

In definitive formulations of utilitarianism developed by Jeremy Bentham (1748–1832) and John Stuart Mill (1806–1873), ethical decision making is portrayed as a problem in evaluating alternative actions in terms of their expected benefit and harm. An ethical decision maker treats choice as an optimization problem where the worth of decision outcomes to all affected parties is a quantity for which an optimal value is sought. This very general specification leaves many interpretative questions open. What counts as a benefit or a harm? How should trade-offs between benefit to one party and harm to another party be reflected in the optimization process? Who counts as an affected party? For example, Bentham is often noted for his opinion that decisions should take account of their impact on non-human animals (Singer, 1975; Derrida, 2008). What is relevant in the present context is that ethical conduct is a function of the expected value that can be assigned to the consequences of each decision option, once these admittedly difficult interpretative issues have been resolved.

In contrast to the utilitarian approach, a Kantian stresses the way in which any decision maker will make choices according to some principle or rule. Immanuel Kant (1724–1804) provides an approach for testing decision rules according to a master rule, the categorical imperative (Kant, 1785/2002).

Decision makers are instructed to ask themselves whether the principle justifying their own action could serve as a universal law, as a principle that would be used by any decision maker to determine what is ethically correct for any and all relevantly similar cases. One point of this question is to make the decision maker aware of possible sources of favoritism or bias. In particular, asking whether one would be willing to have others make decisions according to a given rule should sensitize a decision maker to whether or not they would consider the decision to have been ethically correct even when they were in the position of an affected party. Hence some have suggested that the overall thrust of Kantian ethical theory is to promote fairness as a standard for ethical decision making that overrides all other principles (Rawls, 1980), while others have suggested that the categorical imperative is roughly equivalent to the Golden Rule: Do unto others as you would have them do unto you (Hirst, 1934).

Those who believe that science does not take sides on ethical issues will want to claim that scientific risk assessments are neutral bystanders in the philosophical debate between utilitarians and Kantians. But Bentham was clearly aware that the consequences of a decision can rarely be predicted with certainty. His approach built on the work of decision analysts who had studied gambling problems. The utilitarian response to uncertainty is to represent both benefit and harm as quantities of worth or value that reflect the probability that the beneficial or harmful outcomes will actually materialize (Bentham, 1948). Thus, Bentham's approach prefigures that of twentieth-century decision theorists who characterize decision making as a problem of making the best available trade-off between risk and benefit, and who presume that a risk analysis advises the decision maker of both the value and harm associated with potential hazards and also the likelihood that the hazards will actually occur. Much of present-day risk analysis operates under the implicit assumption that decision makers understand their task in the terms that Bentham specified more than 200 years ago. As a matter of intellectual history, at least, risk assessment is a direct intellectual descendent of utilitarian ethics.

However, this is not to say that Kantians have nothing to say about risk. Intuitively, application of the Golden Rule suggests that an agent should be particularly sensitive to the impact of his or her action on freedom of others. Indeed, if other parties remain free to act according to their own lights, one may presume that the decision under review has little or no ethical significance from a Kantian perspective. For many who take this approach, actions that affect only the agent himself are not strictly moral at all, but should be considered purely prudential (Vaccari, 2008). From the Kantian

perspective, it is mostly situations in which risks are imposed upon others that ethical evaluation is required. From the perspective of Kantian ethical theory, real-life cases of risk-based decision making show that the utilitarian's risk-benefit approach is unethical. In the 1930s the US Public Health Service conducted extensive research on syphilis, including an observational study of untreated syphilis in Macon County, Alabama. The Tuskegee Study continued into the 1970s, well after penicillin had been recognized as an effective treatment for syphilis. The researchers' rationale for allowing the study to continue was influenced by multiple factors (Rothman, 1982), but the National Institutes of Health report on the incident (henceforth, "the Belmont report") stressed the way that a narrowly utilitarian approach to the ethical evaluation of medical research led researchers astray (Jones, 1993).

A utilitarian evaluating the Tuskegee Study might have reasoned that benefits from continued observation of patients suffering from the untreated disease would be justified by a better clinical understanding of the disease and its effects. (I do not assert that all utilitarians would reason this way, only that this pattern is discussed in the literature on Tuskegee and the Belmont report [see Jones, 1993].) For a utilitarian, these benefits could potentially offset the risk of harm associated with continuing to observe disease in the research subjects enrolled in the study. Nazi scientists also rationalized horrific research on prisoners being held in concentration camps, apparently applying a similar application of the utilitarian maxim. However, if there is any instance in which the test suggested by the categorical imperative would suggest that utilitarian reasoning cannot be universalized, the case of the Nazi doctors would qualify (Macklin, 1992). Following the Belmont report, the principle of informed consent has been the standard for ethical acceptability of risk to human subjects in research settings. Succinctly, research that imposes risk on human subjects is ethically acceptable only if subjects have been fully informed of all risks and researchers have secured freely given consent. From the perspective of Kantian ethical theory, the utilitarian emphasis on outcomes introduces bias because it directs a decision maker's attention away from the factors of greatest ethical relevance.

To summarize this section, the conceptualization of risk as an expected value that reflects both hazard and exposure is historically and conceptually tied to utilitarian approaches in ethical theory. Bentham would have agreed that the best way to understand risk is to evaluate the harm that would occur when a hazard materializes, and to reflect the decision maker's uncertainty about whether the hazard would materialize probabilistically. In contrast to this approach, Kantian ethical theory stresses the dignity and autonomy of affected parties, and views the imposition of risk upon any affected party as

a potential affront to that person's dignity and autonomy. The relative value of either hazard *or* the probability of exposure do not figure prominently in deriving the ethical norms pertinent to risk imposition in the Kantian approach.

Ethical Bias in Risk Communication

One important strand of research on risk communication involves problems in which communicators hope to induce behavioral change among individuals and social groups in light of research on risk factors that contribute to mortality and morbidity (Fan & Holway, 1994; Yanovitzky & Stryker, 2000). The presumption behind these efforts is that target groups do not know that their behavior is risky, and that an effective information campaign will induce voluntary behavioral change once people have become aware of the relationship between their conduct and their exposure to hazards. Cates, Grimes, Ory, & Tyler (1977) described an apparently successful risk communication effort in the public media to advise women of the risks associated with leaving an IUD in place after conception. Conveying science-based information about the hazards of failing to remove an IUD led to rapid behavioral change among women and to the desired decline in injury to health for pregnant women and their unborn children. Risk communication efforts associated with smoking, HIV-AIDS, and numerous other behaviors have had mixed results in changing behavior.

The evaluation of these cases from the perspective of competing ethical theories not only illustrates the difference between the ethical principles endorsed by utilitarians and Kantians, but also shows that this difference may not matter much for some paradigmatic cases of risk communication. From a utilitarian perspective, the criterion for ethical management of risk is to achieve optimal trade-offs between beneficial and risky activities. Since the benefits from activities that expose people to the hazards of IUDs, smoking, and HIV-AIDS appear trivial in comparison to the harm that prevails when risk is realized, a reasonable application of the utilitarian maxim suggests that behavior change to recognize these risks is strongly indicated. If so, the standard for ethical success in risk communication would appear to reside in its impact on behavioral change. The principle of informed consent, in contrast, requires only that people actually know what the relevant risks are, and not that they also engage in behavior change. An Environmental Protection Agency official appeared to endorse this view when he wrote: "Success in risk communication is not to be measured by whether the public chooses the set of outcomes that minimizes risk as estimated by the experts. It is achieved

instead when those outcomes are knowingly chosen by a well-informed public" (Russell, 1987, p. 21).

But cases such as IUD use and HIV-AIDS are also ones in which risk factors are associated with intentional actions that are under the respective individuals' control. On the one hand, if there are truly negligible benefits associated with a risky activity, as would seem to be the case in failing to remove an IUD, informed consent can be expected to produce the behavioral change indicated by the utilitarian maxim. This is therefore a case in which any reasonable person will almost certainly respond to a risk communication message with behavioral change. There is no reason to expect divergence between what individuals choose and what experts would regard as optimizing behavior. On the other hand, when there is little chance that interference in individual freedom will succeed in inducing a desired behavioral change, it is unlikely that a utilitarian using the optimizing approach will ever recommend actions that would violate the categorical imperative. In the case of sexual behavior, the long history of failed efforts to regulate behavior provides a reason not to recommend risk management strategies that would diverge from what is required by a principle of informed consent: that is, providing the information on risk and simply hoping for behavioral change. The theoretical difference between optimizing and informed consent makes little practical difference in either case.

However, there are risk policy domains where ethically based debates can rage. The management of risks from traffic accidents illustrates the point. From a utilitarian perspective, mandatory precautions such as seat-belt and motorcycle helmet laws are justifiable because they save lives (Hauser, 1974; Watson, Zador, & Wilks, 1981). From a perspective that stresses individual informed consent, such laws intrude upon the freedom of an individual decision maker (Irwin, 1987; Rollin, 2006). As with sexual activity, decisions about whether to use seat belts or helmets do not directly cause a hazard to anyone other than the decision maker (though this is not to deny that there may be social costs or indirect effects on third parties). From the standpoint of informed consent, it is reasonable to provide drivers with information, but there would be no ethical imperative to ensure that they use information in the manner that a risk optimization paradigm would suggest. Thus the assumption that risk communication is intended to induce behavioral change would appear to have an underlying commitment to utilitarian ethics.

When an action imposes risk on someone other than the decision maker, the informed consent considerations that arose in connection with the Belmont report become relevant. Clearly, many activities in contemporary society impose risk on others, yet provide little or no opportunity for giving or

withholding consent to the host of other industrial activities. Decision making on the regulation of these activities falls to public authorities. Debate over this decision making mirrors classic philosophical debates over whether public policies should aim to optimize risk and benefit, as utilitarianism claims, or whether they should strive to protect affected parties from intrusion into their sphere of personal freedom. An extreme interpretation of the Kantian view might hold that there are no cases in which environmental risks could be ethically tolerated short of an effort that actually secures consent from affected parties (Machan, 1984). More realistically, the view might be that our political system reaches a compromise in which the willingness of most citizens to accept risks in exchange for the benefits of the economic activity derived from polluting activity reflects a kind of implied consent (Killingsworth & Palmer, 1992). In either case, the function of risk communication resides in the need for those who bear risks to have a clear understanding of them, rather than in whether or not their behavior produces optimal risk-benefit trade-offs.

In contrast to my claim that science-based risk communication needs to be attentive to this tension between utilitarian and Kantian ethics, a great deal of the scholarly literature on environmental risks appears to simply assume that the utilitarian viewpoint is ethically correct. Cross (1998) writes that what matters ethically is whether optimal trade-offs are made. Public opinion figures indirectly in the process of reaching this optimum, because it is widely believed that irrational attitudes, heuristics and biases, misperceptions and the NIMBY¹ syndrome can create political roadblocks to the implementation of those policies that would, in fact, most fully satisfy the optimizing goals of the utilitarian maxim (Starr & Whipple, 1980; Lewis, 1990). For a thoroughgoing utilitarian, the goal of risk communication is unabashedly one of manipulating opinion and behavior so that an optimal balance of risk and benefit can be achieved. This need not imply that the question of whether risks are voluntarily accepted is irrelevant to a utilitarian. Chancey Starr, one of the founding figures in contemporary risk analysis, argued that standards of risk acceptability for involuntary risks would indeed be much higher than for risks that people incur when they voluntarily engage in high risk activities. But Starr's approach was thoroughly utilitarian in its ethical commitments (Starr, 1972). It is also quite possible to reconcile utilitarianism with the need

1. NIMBY is an acronym for "not in my back yard." The NIMBY syndrome is the tendency for people to form risk attitudes and engage in political action when risky activities are geographically proximate, but to have different attitudes when risks are described abstractly or are borne by distant others. The NIMBY syndrome implies that people are active on risk issues only when their self-interest is involved.

for good faith communication efforts, particularly when non-experts have information that experts lack (Wynne, 1996). Knowing how people will act in a given situation will generally be important for anyone who hopes to achieve the greatest good for the greatest number. Placing people in a position where they can engage in politics on an informed basis may not be the most efficacious way to achieve an optimal ratio of benefit and risk.

Policy change over smoking represents an interesting and illustrative case. Before research results demonstrated the hazards to third parties from secondhand smoke, there had been little momentum behind efforts to introduce mandatory laws governing smoking behavior. Although there was a gradual increase in legislation intended to limit or discourage smoking from the early 1970s, during this era smoking was largely conceptualized as an individual behavior. Exposure to secondhand smoke was regarded as an annoyance by nonsmokers, but not as an activity that exposed them to risk (Syme & Alcala, 1982). Once the health effects of exposure to secondhand smoke became well understood, a new rationale emerged for legal remedies (Walsh & Gordon, 1986; Ezra, 1990). In the ethical terminology developed here, it became possible to see smoking as a behavior that imposed risk on nonsmokers, and given that ethical framing of the issue, a morally compelling case for legal bans on smoking in public areas could be mounted by mobilizing rationales derived from Kantian ethical theory. Laws that regulate exposure to secondhand smoke have proliferated in the past quarter century (Eriksen & Cerak, 2008). While a consistent utilitarian would have had enough reason to support policies against smoking even in the absence of scientific findings on secondhand smoke, it was only when smoking could be seen as imposing a risk on others that change began to occur. Green and Gerken (1989) characterize this as a victory of self-interest over ethics, implying that there were no compelling ethical reasons for change to occur. But Kantians might well have viewed smoking as a purely voluntary risk prior to the emergence of scientific results on secondhand smoke, then realized that the rights of affected parties (themselves or others) were actually at stake. From a philosophical perspective Green and Gerken exhibit a strange blindness to the difference between utilitarian and Kantian thinking, illustrating that such blindness can be found among both social and biophysical scientists.

There have been other cases where the ethical framing for a risk issue has remained contentious. Labeling for food containing ingredients derived from genetically engineered crops (or so-called GMOs) provide an example. When these foods began to appear on US markets in the late 1990s, officials at the US Food and Drug Administration (FDA) determined that since there were no health risks associated with consuming these foods, no benefit could

be derived from providing labels advising consumers of their presence. This policy was a fairly straightforward application of utilitarian reasoning and was defended as such in analyses that supported the FDA's decision (Vogt & Parrish, 1999). Arguments supporting labels called upon citizens' "right to know" and linked values that individual consumers might hold regarding personal risks with religious and other personal freedoms that are relevant to food choice (Thompson, 2002).

In summation, the overall ethical framework in which a given risk problem is conceptualized can play a significant role in shaping the way one would develop an appropriate communication effort. In cases where informed consent has been clearly identified as the appropriate standard, as in developing protocols for the use of human subjects in research contexts, a communication tool should clearly try to minimize its persuasive component. At the same time, some of the most widely studied problem areas involve educational and persuasion efforts where the attempt to achieve behavior change would appear to be ethically well justified. But the role of risk communication in a wide range of policy-relevant cases is far less clear. Is it to replicate the views of people who have studied comparative risks widely in the general populace? Is it to enable the accomplishment of those social goals that would be endorsed by utilitarian or Kantian ethical theories, respectively? Even if one remains agnostic about the answers that might be given to such questions, the above analysis suggests that specialists in risk communication would be well advised to study the relationship between utilitarian and Kantian ethical theories more carefully in the future. At a minimum, simply presuming that the least ethically complex cases of risk communication are prototypical is unjustified.

Grammatical Bias in Risk Communication

Given its usage in ordinary language, the word "risk" displays grammatical patterns that deviate significantly from the definitions in use by scientific analysts. Two issues in expert versus lay usage can take on ethical significance. One concerns whether or not all references to risk imply some sort of value judgment, or whether some standard of strong value neutrality is possible. The second concerns the way that many ordinary language discourse contexts make strong associations between risk and agency, implying an opening to further discourse on responsibility. In contrast, the usage specified in scientific risk assessment makes no association with intentional action and can be applied readily to circumstances in which human beings, organizations, or other intentional agents play no role in creating the conditions for risk. Each of these issues is discussed in turn.

Some theorists have argued that the scientific analysis of risk should be "value free," while acknowledging that any attempt to manage risks will inevitably involve a decision maker in value judgments (Rowe, 1977; Cross, 1998). Others have countered that any conceptualization of risk will involve at least the value judgment that possible outcomes are regarded as adverse. On this latter view, people do not discuss the risk of happiness and satisfaction unless they are speculating on the possibility that these situations might have some unnoticed downside potential (Schulze & Kneese, 1981; Rayner & Cantor, 1987; Hansson, 1996; Cranor, 1997). As noted above, Paul Slovic, a founding figure in the study of risk perception and risk communication, has characterized the divide between these perspectives as "the risk wars" (Slovic, 1999).

Only recently have empirical studies on the way non-specialists talk about risk begun to appear. Tulloch and Lupton (2003) conducted a number of interviews on the topic of risk and report their findings in the book *Risk and Everyday Life*. They report

a dominant tendency to characterize risk as negative. The emotions of fear and dread were associated with interpretations of risk as danger and the unknown. Uncertainty, insecurity and loss of control over the future were associated with risk, as was the need to try and contain this loss of control through careful considerations of the results of risk-taking. But there was also evidence in many people's accounts of positive meanings associated with risk: adventure, the conditions of excitement, elation and enjoyment, the opportunity to engage in self-actualization and self-improvement. (p. 19)

Tulloch and Lupton undertook their studies in the context of evaluating Beck's thesis that a feeling of being at risk has become pervasive in modern society (1992). They believe that while aspects of their work support Beck's thesis, counter-themes associated with positive meanings reinforce the sense that meanings of risk are subject to significant variation depending on race, gender, and cultural location. Their research suggests that in ordinary discourse, risk is inherently value-laden. A quantitative study of numerous examples of discourse using the word "risk" does not support this generalization, however, and concludes: "From the frame semantics perspective, linguists found that at its core, as both a noun and a verb, 'risk' emphasized actions, agents or protagonists, and bad outcomes such as loss of a valuable asset" (Hamilton, Adolphs, & Nerlich, 2007, p. 178).

My own view is that value judgments are involved, but that in many cases they are definitive and hardly noticed. For example, in many areas of risk assessment relevant to public health the value judgment implied by taking human mortality and morbidity to be a bad thing is utterly uncontroversial. To

point out that it is nonetheless a value judgment is not to imply that it should be debated. Furthermore, advocates of a so-called value-free risk science are clearly correct to insist on the relevance of science both to the identification of hazards and to the derivation of probabilities to estimate the likelihood that harm from hazards will actually materialize. The scientific analysis of these elements should be shielded from forces that would bias the analysis toward favored outcomes. To say that science should be shielded from biasing forces expresses a value, albeit an epistemic value rather than a sociopolitical value. Ben-Ari and Or-Chen (2009) draw a distinction between social values, which express preferences toward specific social outcomes, and epistemic values, which specify the norms for scientific inquiry. They argue that recognizing the difference between these two types of value will clarify a number of disputes in scientific risk assessment.

However, over the last several decades it has been more typical for risk science to advocate a "value-free" ideal. The "value-free science" viewpoint is often conjoined with an insistence on the scientific community's authority to specify the meaning of words. To insist that risk, properly understood, must *always* be understood as a function of hazard and exposure illustrates a grammatical bias with ethical significance, but it is important to understand why scientific risk analysts take such pains to talk this way. Within the context of scientific risk assessment, clear definitions of hazard, or the potential for harm that may be associated with a phenomenon or activity, and exposure, or the factors that contribute to the materialization of this harm, are essential. Once characterization of hazard and exposure are available, it is possible to interpret the risk associated with a possible event e according to the broadly specifiable formula

$$\text{Risk}_e = f(v_e, p_e)$$

where v_e is the harm or harmful outcome (often specified simply in terms of morbidity and mortality) and p_e is the probability that the event occurs, given scientifically investigable conditions of exposure. In this formula f can incorporate a number of complex mathematical concepts. In the simple case of quantifying the risk of losing a standard coin flip, v_e is the amount wagered, p_e is the probability of losing (i.e., 0.5) and f is multiplication, so the expected adverse value (i.e., risk) is one half of v .²

The simple coin flip illustrates the communicative challenge. If you ask someone what they think the risk of a coin flip is, they might well respond

2. The positive outcome (e.g., winning the flip) is one half of $+v$, making the total expected value of a standard coin flip zero.

by saying that it is what they stand to lose (i.e., v , the amount wagered). But this quantity does not reflect the fact that their *chance* of losing is actually 0.5. The quantitative risk associated with a standard coin flip is one half of the amount wagered, thus not equivalent to whatever one stands to lose. When complex activities embroil the calculation of probabilities in lengthy causal chains and uncertainties, this basic communication challenge is heightened. Scientists who have undertaken painstaking work to estimate hazard and exposure are, in one sense, understandably frustrated when the word "risk" is used in popular contexts in ways that connote the mere potential for harm, with little or no recognition of its likelihood.

In ordinary language the word "risk" is used in this way all the time. However, there is a more subtle point. In ordinary language discourse, the word "risk" can function as a verb. In this grammatical usage, it connotes action by an agent capable of intentionality: "John and Jane risk their personal fortune with an ill-considered business venture." "The Hundsucker Corporation risks the health of everyone in Springfield with its new chemical plant." In these instances, a person and an organization are spoken of as doing something. But in sentences with non-agential subjects, using the word "risk" as a verb produces grammatically ill-formed constructions that must be interpreted metaphorically, if they can be parsed at all: "The mountain risks its flora and fauna with an earthquake." "The tornado risked life and limb in Springfield." Individuals and groups are intentional agents, mountains and tornados are not. There are indeed borderline cases. Animals and other living things can be described as if they acted intentionally: "The mother bear risks her cubs by straying too far." "The begonias risk a late frost by blooming early." But the larger point is that the formula $\text{Risk}_e = f(v_e, p_e)$ does not express an action at all (Thompson, 1999, 2007).

The authors of the quantitative study cited above note similarity between the core properties of the word "risk" when used as either a noun or a verb, and remark on the "interesting" fact that the word is used as a noun much more frequently in scholarly databases than in databases including usage from non-scholarly contexts. This quantitative study supports a correlation between the use of the verb "risk" in discourse contexts in which agency is involved, as distinct from natural hazards or random events. This finding contradicts the view that risk is always adequately characterized by a formula such as $\text{Risk}_e = f(v_e, p_e)$. Expressed as the mere probability of a harmful outcome, risk is tied conceptually to causality, but not agency. I have suggested that there is a natural flow to risk discourse in which early messages that bring risk to the attention of the audience are interpreted according to an "act-classifying" sense of the word. On this interpretation, a key conversational

function of the word “risk” is to move the topic under discussion from the category of the unexceptional and quotidian into the category of those topics, events, or activities that call for action by someone, often the person to whom the communication is directed. Once the topic has been accepted as one calling for action, it may become pertinent to consider the details of probability more carefully. In these contexts, an “event-predicting” sense of the word “risk” that is quite consistent with the $Risk_e = f(v_e, p_e)$ formula preferred by experts may take over. It is not as if ordinary people never think or talk about risk in the same way as experts. Rather, we should expect that any message that interrupts the normal flow of events to raise the subject to risk will be interpreted as a signal that some sort of action needs to be taken (Thompson, 1999; Thompson & Hannah, 2012).

Other work from risk communication studies provides indirect support for a view that I developed from the philosophical study of the way that discussions of risk organize our thoughts toward moral and prudential responsibilities. Risk communication scholars working to effect behavior change have struggled with problems that arise when audiences react to messages fearfully or take them to threaten their self-concept (Lapinski & Boster, 2001; Covello & Sandman, 2001). Witte has proposed a model that emphasizes attention to efficacy—that is, the ability of a recipient of a communication message to take action to remediate or otherwise address the risk (Witte & Allen, 2000; Cho & Witte, 2005). A grammatical analysis suggests participants expect a conversation on risks to involve some point of action that they or others should initiate. There would be no point to a risk communication focus on, for example, background rates of radiation exposure or the eventual death of the sun.

The implicit grammatical tie to agency explains why communicators err when they raise the topic of risk (even implicitly) only for the purpose of reassuring people that everything is just fine. The annals of GMOs provide examples, once again. Risk messaging on foods containing genetically engineered ingredients was calculated to assure consumers that these foods were “substantially equivalent” to other items on their grocery shelves. The message that many took from this messaging was quite the opposite (Katz, 2001). In sum, as with ethical theory, philosophical work in ethics (s.) on the structure and context of risk-oriented discourse and decision making provides the basis for both insight and new hypotheses. Scholars of language and communication might well contribute to an improved understanding of the risk communication processes by paying closer attention to the way that the word “risk” is used in ethically oriented conversational contexts.

Conclusion

Risk and risk communication get inevitably tangled up in ethical considerations because to call something by the name risk is to imply that people have reason to avoid it or at least to be mindful about it. One is thus implying that they have a reason to expect that they (or someone) has something to lose in regard to the topic under discussion. According to one common way of speaking, this is a matter of prudence, rather than ethics. However, in ethics (s.) all topics in which matters of “should” and “ought” arise are of interest. And there are many cases in which the topic of risk does involve how one’s action affects others and vice-versa, in any case, so even by the most exacting standards, conversations about risk are very likely to involve ethical considerations. On the one hand, it is striking how little attention is given to ethics (s.) in the literature of risk communication. For the most part, those scholars who study attitude formation and behavior change in communication practices related to risk display virtually no interest in the ethical question of whether using communication techniques to influence attitudes and change is ethically justified. On the other hand, this fact may not be so striking when one realizes that many of the risk communication efforts that have been mounted clearly are justified and could be shown to be justified using any of the strategies for critical thinking that ethics (s.) provides. Nevertheless, I hope that I have shown that such happy conditions of easy justification are not universally the case.

Utilitarian and Kantian moral frameworks present somewhat different ways of thinking about risk and risk communication. This suggests that in some cases, we think that getting trade-offs right is the goal, while in others we think that the goal of analyzing and then communicating about risk is simply one of placing people in a position where they can make their own decisions. There are also cases where these two goals get tangled up and it becomes controversial (or perhaps simply confusing) as to what risk communication is trying to achieve. On top of this, there are tangles and confusions that arise in connection with the message that risk communication is to contain, regardless of its overarching purpose. Are risk messages simply supposed to tell us how the world works so that we can better estimate the probability of harm or loss? Or are they intended to grab our attention, shake us by the shoulders, and engage in a deliberative search for what we should do? Although forays into ethics (s.) probably do too little to help would-be risk communicators and scholars of risk communication answer these questions, it may nonetheless be important to shake them by the shoulders a bit

and provoke a bit more thoughtful and deliberative inquiry into the nature and function of communicating scientific messages about risk.

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