

What's in a Risk?

Consider two familiar ways of describing an eight-ounce cup containing four ounces of water. We could say that the cup is half *full* or that the cup is half *empty*. Although both descriptions are true, they plainly convey quite different impressions. They color the situation differently, and so, depending upon the context, could be seen as offering different assessments and suggesting different courses of action. Nevertheless, standing behind these true but tendentious descriptions is a neutral and objective description: the eight-ounce cup contains four ounces of water.

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While policy decisions based on tendentious descriptions naturally invite controversy, neutral descriptions help to resolve it. It's difficult to imagine a serious controversy fueled by the difference between the "half-empty" and "half-full" descriptions because the neutral description is so clearly available. Neutral descriptions help resolve controversy by distilling the information from the bias, thereby allowing decisions to have an objective basis.

This example points to a fundamental problem with describing risks. Although there are counterparts to the "half-empty" and "half-full" descriptions—e.g., descriptions of risks in terms of mortality rates or in terms of survival rates—there appears to be no counterpart to the clearly objective description of four ounces of water in an eight-ounce cup.

Several studies have shown that the unavailability of neutral risk descriptions is a fact of human psychology. Indeed, this lack may also reflect deeper issues concerning the often acknowledged difficulty of separating facts from values. Be that as it may, it is at least a fact of social psychology: people do not respond equally to alternative but logically equivalent descriptions of risk.

The lack of neutral descriptions raises a problem for one of the primary ambitions of risk analysis: to aid technological decision making by impartially evaluating technological risks. A problem in describing risks translates directly into a problem in perceiv-

ing and communicating risks, since how we perceive or communicate risks depends upon how we describe them to ourselves or to others.

In this article I shall survey just a few of the many conceptual problems in describing risks. These are not problems about how we happen to talk about risk; they are problems about our understanding of risk. They not only fuel some of the debates over risk analysis, they also reflect the role risk analysis should play in policy debates. Some of these problems reveal the conceptual roots to the unavailability of neutral risk descriptions. Other problems, I will suggest, are actually pseudo-problems: they rest on a mistaken view of what the role of risk analysis should be. That is to say, these problems are problems only if we require risk analysis to play a certain role in policy decisions, one that I believe cannot be maintained once we take seriously the lack of neutral risk descriptions.

A good place to begin is by considering what we mean by "risk." A simple characterization is *probability of harm*. Of course, there are other characterizations of risk, including risk as the magnitude of harm and risk as the expectation value of the harm (i.e., the product of the probability of harm and the magnitude of harm). We can find support in everyday speech for each of these various characterizations; but since all of them build on a prior understanding of both probability and harm, the precise definition of risk need not concern us. Whichever definition we use, we will need to examine issues raised in identifying harms.

Understanding Harm

Differences in risk assessments can often be traced to differences in which harms are to be recognized. We can distinguish "thin" from "thick" conceptions of harm. A thin conception focuses on *physical* harms, understood in terms of mortality and morbidity. Thus, on a thin conception, the harms that could result from releasing a genetically engineered organism consist of the possible physical harms: death or disease. On a thicker conception of harm, we look at a much broader range of losses and damages. Many of these might be considered *social* harms, including, for example, economic losses, social disruption, the abandonment of certain conventions and values, and the undermining of political and social institutions.

Technical risk analysis typically relies on a thin conception of harm: it focuses on the risks of death or disease. Social harms, however, are by no means insignificant or any less real. The accident at the Three Mile Island (TMI) nuclear reactor in 1979 is a case in point. As Paul Slovic has noted, not a single person died in the accident, and few, if any, cancer fatalities

are expected. Nevertheless, "no other accident in our history has produced such costly societal impacts," Slovic writes. "The accident at TMI devastated the utility that owned and operated the plant. It also imposed enormous costs (estimated at 500 billion dollars by one source) on the nuclear industry and on society, through stricter regulations, reduced operations of reactors worldwide, greater public opposition to nuclear power, reliance on more expensive energy sources, and increased costs of reactor construction and operation."

As the accident at TMI demonstrates, risk perceptions or assessments based on a thin conception of harm can greatly underestimate the costs associated with mishaps. This is why public concerns over biotechnology have persisted despite growing scientific assurances that genetic engineering can be done safely. It is not necessarily that the public distrusts scientists; rather, the public and the experts may be using quite different conceptions of harm.

In ways that are perhaps more dramatic than in other technologies, biotechnology tends to raise issues regarding social consequences, some of which might count as harms on a thick conception of harm. Agricultural biotechnology, for example, doesn't simply promise new, more efficient ways of producing food. It also raises questions about the value of the family farm, the centralization of food production, and the meaning of the "all natural ingredients" label. Is the loss of the family farm a harm? Should it enter into risk assessments? Environmental biotechnology doesn't simply promise new ways of cleaning and reclaiming polluted areas. It also points to previously unthinkable ways that we might be able to control the environment or control wildlife to suit our tastes, and so calls into question many of our environmental values. Is the genetic engineering of fish to produce easy entertainment for sports fishermen a harm?

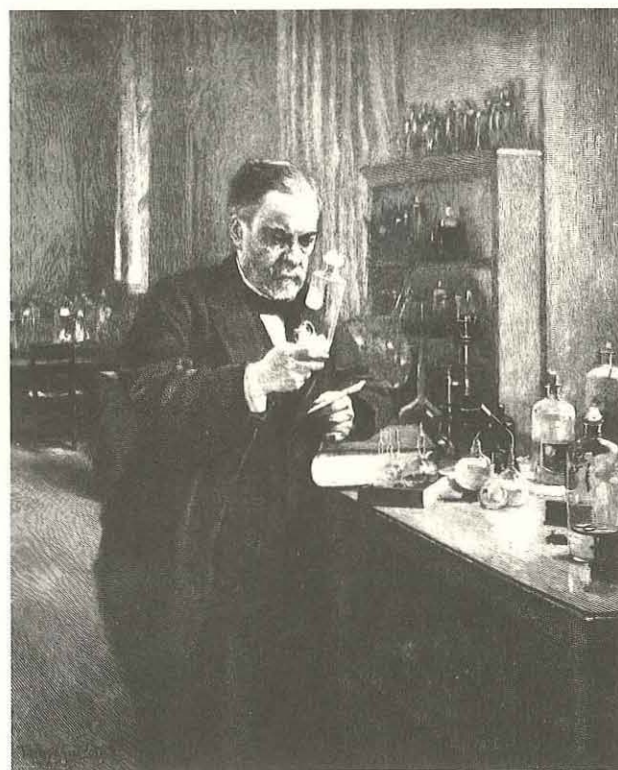
The development of biotechnology will have an impact extending far beyond the benefits of its products and the physical harms that might result from biotechnology's failure in certain cases. Indeed, many potential social harms are not the results of such failures at all; they are the possible results of biotechnology's success. In some ways, the public is more worried about biotechnology's succeeding than about its failing. Social harms, and thick conceptions of harm generally, are notoriously difficult to measure or to compare. There are so many different kinds of harm, and different kinds of harms seldom translate into different degrees of harm without distortion. For example, losing a family heirloom may be a much greater harm than the loss of anything else with the same market value. Treating the loss as merely an economic harm would misrepresent the harm the family actually suffers.

It's also important to note that thick conceptions of harm are controversial. No one disputes that death or disease is a harm. But consider the effects of biotechnology on the relations between universities and industry. Private biotech companies and public univer-

sities are developing joint enterprises, and an increasing number of university professors are pursuing research beneficial to companies in which they have a financial stake. Are the closer ties that appear to be developing between public universities and private industries a harm? Plainly, reasonable people can disagree on this matter, as they disagree about many of the candidates for social harms.

Widespread disagreement about social harms supports the claim that there are no neutral risk descriptions. A controversy over a social harm is typically not a controversy over some straightforwardly determinable empirical fact. It is a controversy over values. For example, everyone might agree that a certain development in agricultural biotechnology will lead to increasing centralization of agribusiness, and so to the demise of the family farm. Nevertheless, there could be—indeed, there is—serious disagreement about whether that development is a *harm*. A controversy like this cannot be resolved by a description of the expected social change *as a harm* because whether it is a harm is precisely what's at issue, and so such a description would not be neutral. On the other hand, any description that did remain neutral on the issue of harm would be question-begging and so could not resolve the controversy. Since there is no neutral way to describe social harms, there is no neutral way to describe the corresponding risks.

The problem of what constitutes a harm becomes even more complicated when we broaden our perspective to an international point of view. Different nations and cultures often have different conceptions of harm because in many cases thick conceptions of harm are



tied to ethical and cultural values. For example, one country might value a particular species of animal more highly than neighboring countries do because of the role that animal plays in the country's history or folklore. That country would therefore see threats to that species as a greater harm than its neighbors would. This could easily lead to sharp disagreements between that country and its neighbors concerning the appropriate trade-offs and levels of safety if these animals are at some significant risk.

A natural response to some of these problems would be to relativize harms: harms should be described in terms of who is affected. Instead of debating, for example, whether the loss of a particular species of plant is a harm, we might simply say that the loss would be a harm for country A (e.g., a loss of income) but not a harm for country B. Unfortunately, this easy way of identifying harms makes comparing harms much more difficult.

A loss of two million dollars is plainly worse than a loss of one million dollars, but is a loss of two million dollars by country A worse than a loss of one million dollars by country B? Worse for whom? A difficulty in comparing harms directly translates into a difficulty in comparing risks.

The Importance of Neutrality

The problem of describing risks to others—of risk communication—is often framed as a problem about how informed experts should deal with an uninformed public: Given widespread ignorance of science and probabilities, how can experts inform the public about risks without provoking uninformed or irrational responses? C.J. Daggett, for example, claims that "... many people are not comfortable with mathematical probability as a guide for living. If you inform people that their risk of developing cancer from a 70-year exposure to a certain carcinogen at ambient level ranges between 10^{-5} and 10^{-7} , their response may be, 'Okay, but can I drink the water?'"

The natural response to this situation is to say that the public needs to be better educated. Nevertheless, we should realize how tendentious both this formulation of the situation and the natural response actually are. We have already noted that the range of harms identified in risk assessments can be controversial. If the difference between the experts and the public is over what possible harms ought to be considered in the assessment, then it is by no means obvious that the public is always wrong on this matter.

By the same token, the public's understanding of probabilities might be better than it appears. Although Daggett's example is intended to illustrate how people fail to understand small numbers, it might equally point to a genuine problem with applying probabilities to single cases. If the probability expresses a long-run frequency, then it says nothing about the short-run frequency, much less about the particular short run that interests me: this particular case of my drinking the water. Better education is indeed important—for everyone.

Let's consider a less tendentious formulation of the problem of risk communication: Given the problems in describing risks, how can risks be communicated responsibly? In particular, if risk descriptions are not neutral, how can risk communication be a matter of *informing*, rather than a matter of *handling*, the public?

It is tempting to believe that neutrality can be achieved through balance. If we tell all sides of the story, then the biases will cancel each other out. Unfortunately, even if we set aside the worry that this approach might do more to confuse than to inform, the attempt at balancing will not work. In the first place, telling all sides is an unrealistic demand and a dubious ideal. We don't know how many possible sides there ever are to a story, and some possible sides are just too crazy to be told. Second, implicit in talk of balance is the idea of prejudicial distance: two differing views do not balance each other if one is far more extreme than the other. But we can't know whether one risk description is more extreme than another without having an idea of where the center lies; and the lack of neutral risk descriptions means that we don't know what a central position would be. In short, if we knew what was necessary in order to balance risk descriptions, we wouldn't need to appeal to balancing in order to provide neutral risk descriptions.

Conclusion

Rather than consider other suggestions for approximating neutral risk descriptions, I want instead to take seriously the idea that there are no neutral risk descriptions. And so I want to question an underlying assumption in this discussion. Are neutral risk descriptions necessary for responsible risk communication?

An affirmative answer appears to rest on the following picture of communication: There is a clear distinction between the informational content of a message and its presentation. What is being communicated is the information, but whether the communication is successful (effective, clear, etc.) depends upon the presentation. The theoretical distinction between information and presentation can of course be obscured in practice. A message can be presented so that it appears to say more or less than it really does. Therein lies the genius of advertising and propaganda.

On this view, a nonneutral risk description obscures the informational content of the risk message because risk information itself is considered to be neutral, albeit "neutral" in a different sense. Because risk information is objective, it grounds the ideal of risk descriptions that are neutral and therefore uncontroversial. Consequently, responsible communication consists in conveying just the information. Intending to convey anything more or less would be deceptive and manipulative.

This picture of communication fits with a common view of the role of risk analysis in policy debates. Most commentators agree that the *management* of risks is a political or social decision because it turns on society's goals and what trade-offs are deemed acceptable. Risk management should therefore be as controversial as

any other political matter. The role of risk *analysis*, however, is to help rationalize public debate over risk management. First we determine what harms we are likely to face; then we debate what actions we ought to take. How could it be otherwise? If we disagree about the harms, any debate about actions would be at cross purposes and so hardly open to a rational resolution. Thus, the requirement that risk descriptions be neutral is part of a picture in which the information about the risks is above the fray. Although there can be controversies over risk information, these are controversies over technical matters, *not* political or social controversies.

These views cannot be maintained if we take seriously the idea that risk descriptions aren't neutral. The lack of neutral risk descriptions suggests that risk information itself is nonneutral. Instead of obscuring or distorting, a nonneutral description may in fact accurately convey the risk information. Responsible risk communication does not demand neutrality.

Note, for example, that many descriptions of the risks associated with drunk driving, drugs, or certain sexual activities are hardly neutral. They are often full of graphic details couched in alarming language. Not only is providing such descriptions sometimes not seen as irresponsible, providing anything less alarming could be seen as irresponsible. The point can be stated generally: Suppose you have two alternative risk descriptions, each equally supported by the available evidence, but one more alarming than the other. Which description you use to communicate the risks should depend upon whether you believe the risks are alarming. Acting otherwise would be irresponsible.

(While a number of details need to be spelled out, students of Hume may recognize this proposal as an attempt at a "skeptical solution" to the earlier skeptical doubts raised about risk descriptions.)

Of course, this point is not a license for misleading descriptions. If you know that the audience will draw what you believe are false or unsupported conclusions from the risk description, then the audience is being misled—manipulated rather than informed. In that case, the risk description is hardly a proper alternative to one that doesn't mislead.

Nevertheless, risk analysis is a controversial matter. Even if a communication doesn't mislead, it will still be controversial. But that is what we should expect—and foster. Once we acknowledge the nonneutrality of risk information, we begin to see describing risks—and so, communicating risks—for what it is: not something that occurs prior to the public debate, but rather part of that debate. Risk communication is part of risk management.

— Robert Wachbroit

This article has been condensed and adapted from "Describing Risk," chapt. 16 in Morris A. Levin and Harlee S. Strauss, eds., *Risk Assessment in Genetic Engineering* (New York: McGraw-Hill, 1991). The sources cited are: P. Slovic, "The Perception and Management of Therapeutic Risk," 1989 (unpublished paper presented to the Royal College of Physicians); C.J. Daggett, "The Role of Risk Communication in Environmental Gridlock," in V.T. Covello, D.B. McCallum, and M.T. Pavlov, eds., *The Role and Responsibility of Government and Non-Government Organizations* (New York: Plenum, 1989).

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