

THEORIES OF RISK PERCEPTION: WHO FEARS WHAT AND WHY?

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In social science rival theories seeking to answer the same questions rarely confront one another. Indeed, a variety of perspectives has been employed in research on public perception of risk, but alternative formulations remain largely untested. Missing most of all is a focused comparison of rival hypotheses.

One could hardly find many subjects that are better known or considered more important to more people nowadays than the controversies over harm to the natural environment and the human body attributed to modern technology, whether this be from chemical carcinogens or nuclear power or noxious products introduced by industry into the land, sea, or air, or into water or food supplies. Thus we ask: Why are products and practices once thought to be safe (or safe enough) perceived increasingly as dangerous? Who (what sort of people) views technology as largely benign, and who as mostly dangerous? To what degree are different people equally worried about the same dangers, or to what extent do some perceive certain risks as great that

others think of as small? And how do concerns across different kinds of risk—war, social deviance, economic troubles as well as technology—vary for given individuals? Only by comparisons across types of danger can we learn whether individuals have a general tendency to be risk averse or risk taking, or whether their perceptions of danger depend upon the meaning they give to objects of potential concern. The test we shall put to each theory of risk perception is its ability to predict and explain what kinds of people will perceive which potential hazards to be how dangerous.

The most widely held theory of risk perception we call *the knowledge theory*: the often implicit notion that people perceive technologies (and other things) to be dangerous because they *know* them to be dangerous. In a critical review of *Risk and Culture*,¹ by Mary Douglas and Aaron Wildavsky, for instance, John Holdren's belief that perceivers are merely registering the actual extent of danger to themselves—the of-course-people-are-worried-they-have-lots-to-worry-about thesis—comes out clearly:

A much simpler description might suffice: people worry most about the risks that seem most directly to threaten their well being at the mo-

ment; environmental concerns predominate only where and when people imagine the risks of violence and economic ruin to be under control. . . . What is wrong, after all, with the simple idea—paralleling Maslow's stages of wants—that worries about more subtle and complex threats will materialize if, and only if, the most direct and obvious threats are taken care of?²

If Holdren is correct, perception of danger should accord with what individuals know about the risk in question. But do risk perceptions and knowledge coincide?

Another commonly held cause of risk perception follows from *personality theory*. In conversations we frequently hear personality referred to in such a way that individuals seem to be without discrimination in their risk-aversion or risk-taking propensities: some individuals love risk taking so they take many risks, while others are risk averse and seek to avoid as many risks as they can. We will test this common, if extreme, view. We will also examine a more moderate theory of personality: that stable individual differences among persons are systematically correlated with their perceptions of danger. Leaving aside the extraordinary Oblimov-like characters staying in bed all their lives, or Evel Knievels breaking bones on too-daring feats, this version of personality theory suggests that individuals are so constituted as to take or reject risks in an enduring manner.³ But do traditionally assessed attributes of personality such as intrapsychic dynamics and interpersonal traits relate to risk perceptions and preferences in predictable ways?

The third set of explanations for public perceptions of danger follow two versions of *economic theory*. In one, the rich are more willing to take risks stemming from technology because they benefit more and are somehow shielded from adverse consequences. The poor presumably feel just the opposite. In "post-materialist" theory, the rationale is reversed, however: precisely because living standards have improved, the new rich are less

interested in what they have (affluence) and what got them there (capitalism), than in what they think they used to have (closer social relations), and what they would like to have (better health).⁴ Is it true, however, that the newly affluent aspire to post-materialist values, such as interpersonal harmony, and hence fear environmental pollution and chemical contamination?

Other explanations for public reactions to potential hazards are based on *political theory*. These accounts view the controversies over risk as struggles over interests, such as holding office or party advantage. The view of politics as clashing interests connects conflicts to different positions in society. The hope for explanatory power in such approaches to risk perception is thus placed on social and demographic characteristics such as gender, age, social class, liberal-conservative ratings, and/or adherence to political parties.⁵

Viewing individuals as the active organizers of their own perceptions, *cultural theorists* have proposed that individuals choose what to fear (and how much to fear it), in order to support their way of life.⁶ In this perspective, selective attention to risk, and preferences among different types of risk taking (or avoiding), correspond to *cultural biases*—that is, to worldviews or ideologies entailing deeply held values and beliefs defending different patterns of social relations. *Social relations* are defined in cultural theory as a small number of distinctive patterns of interpersonal relationships—hierarchical, egalitarian, or individualist.⁷ No causal priority is given to cultural biases or social relations; they are always found together interacting in a mutually reinforcing manner. Thus there are no relationships without cultural biases to justify them, and no biases without relations to uphold them.

Socially viable combinations of cultural biases and social relations are referred to in cultural theory as *ways of life* or as *political cultures*. More specifically, then, hierarchical, egalitarian, and individualist forms of social relations, together with the cultural biases

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that justify them, and are hypothesized to engender distinctive representations of what constitutes a hazard and what does not. Among all possible risks, those selected for worry or dismissal are functional in the sense that they strengthen one of these ways of life and weaken the others. This sort of explanation is at once more political (there is a political purpose to all of this perceiving—defending a way of life and attacking others) and less obvious (what has risk perception to do with ways of life?).

Since cultural biases are forms of ideology, there should be high correlations between certain biases and corresponding ideologies (e.g., egalitarianism and political liberalism). When we vary the kinds of possible dangers to which people react, however, we should see that the left-right distinction captures the cultural bias of egalitarianism but fails to distinguish between hierarchy and individualism. Hence we expect the three cultural biases to predict a broad spectrum of risk perceptions better than political ideology does.

According to cultural theory, adherents of hierarchy perceive acts of social deviance to be dangerous because such behavior may disrupt their preferred (superior/subordinate) form of social relations. By contrast, advocates of greater equality of conditions abhor the role differentiation characteristic of hierarchy because ranked stations signify inequality. Egalitarians reject the prescriptions associated with hierarchy (i.e., who is allowed to do what and with whom), and thus show much less concern about social deviance.

Individualist cultures support self-regulation, including the freedom to bid and bargain. The labyrinth of normative constraints and controls on behavior that are valued in hierarchies are perceived as threats to the autonomy of the individualist, who prefers to negotiate for himself. Social deviance is a threat to individualist culture only when it limits freedom, or when it is disruptive of market relationships. Our expectation is that individualists should take a stance between hier-

archists, to whom social deviance is a major risk, and egalitarians, to whom it is a minor risk at most.

Egalitarians claim that nature is "fragile" in order to justify sharing the earth's limited resources and to discomfort individualists, whose life of bidding and bargaining would be impossible if they had to worry too much about disturbing nature. On the contrary, individualists claim that nature is "cornucopian," so that if people are released from artificial constraints (like excessive environmental regulations) there will be no limits to the abundance for all, thereby more than compensating for any damage they do. Hierarchists have something in common with individualists: they approve of technological processes and products, provided their experts have given the appropriate safety certifications and the applicable rules and regulations are followed. In hierarchical culture, nature is "perverse or tolerant"; good will come if you follow their rules and experts, bad if you don't.

People who hold an egalitarian bias (who value strong equality in the sense of diminishing distinctions among people such as wealth, race, gender, authority, etc.) would perceive the dangers associated with technology to be great, and its attendant benefits to be small. They believe that an inegalitarian society is likely to insult the environment just as it exploits poor people. Those who endorse egalitarianism would also rate the risks of social deviance to be relatively low. What right has an unconscionably inegalitarian system to make demands or to set standards? The perceived risks of war among egalitarians would be low to moderate: they are likely to mistrust the military (a prototypical hierarchy); they also believe that the threat of war abroad is exaggerated by the establishment coalition of hierarchy and individualism in order to justify an inegalitarian system at home.

Cultural theory's predictions for the individualist bias are just the opposite: its adherents perceive the dangers of technology as

minimal, in part because they trust that their institutions can control or compensate for the severity of untoward events. These same predictions hold for the cultural bias of hierarchy. How then do we distinguish between the worldviews of hierarchists and individualists? By varying the object of concern. A study of technological risks alone would leave these two cultures hopelessly confounded. Both are technologically optimistic, individualists because they see technology as a vehicle for unlimited individual enterprise—to them risk is opportunity—and hierarchists because they believe that technology endorsed by their experts is bound to improve the quality of life.

Due to the emphasis placed on obedience to authority within hierarchy, its supporters scorn deviant behavior. In contrast, individualists, who prefer to substitute self-regulation for authority, are much more willing to permit behavior that is the product of agreement. And yet, here too, a distinction must be made. If the object of attention is personal behavior, such as sex between consenting adults, individualists will be against allowing government to intervene. But if the subject is crime or violence against established institutions, they will be more disposed to support a governmental crackdown. In other words, if "order" signifies support for the stability and legitimacy necessary for market relationships, individualists will support government action toward that end.

Economic troubles represent a different kind of risk than those of technology or social deviance, since almost everyone has a reason to worry about them—egalitarians because lower living standards are especially harmful to the poorest people, and adherents of hierarchy because it weakens the system they wish to defend. We would expect individualists to fear economic failure more than others, however, because the marketplace is the institution most central to their life of negotiated contracts.

To test these rival theories—knowledge,

personality, economic, political, and cultural—we drew upon the risk-perception data archives established by Kenneth H. Craik, David Buss, and Karl Dake at the University of California's Institute of Personality Assessment and Research.⁸ We used the *pro-risk* index of their *Societal Risk Policy* instrument to gauge the extent of an individual's endorsement of risk taking versus risk aversion in regard to technology. This pro-risk index assesses whether risk taking and risk management are viewed as opportunities for advancement, or rather as invitations to catastrophe at the societal level.

We assessed perceptions of risk associated with *technology and the environment, war, social deviance, and economic troubles* by using variables chosen from a list of 36 "concerns that people have about society today." Following procedures similar to those used in the most important pioneering study of risk perceptions, we selected average ratings of 25 technologies on *risk* and *benefit* for use.⁹ These indices enable us to compare public responses to different kinds of dangers. Now we turn to the factors that have been used to explain such responses.

Knowledge. One measure of knowledge we have used is the individual's self-report of how much he or she knows about specific technologies. Another measure is self-report of educational level. Self-ratings are the simplest and best way to address some psychological phenomena (who knows better than the individual how much dread a perceived hazard evokes for him?), while in regard to other phenomena they are notoriously poor. To avoid the potential pitfalls of relying only on self-reported knowledge, we developed a measure of perceptual accuracy based on differences between public and expert judgments of annual fatalities associated with 8 technologies: contraceptives, nuclear power, diagnostic X rays, bicycles, lawn mowers, motor vehicles, home appliances, and commercial aviation.¹⁰

Personality. In order to explore the correlations among personality characteristics and risk perceptions, we have drawn upon a broad set of traditional personality measures, including the *Adjective Check List* and the *California Psychological Inventory*.¹¹

Political Orientation. To evaluate predictions of risk perceptions based on political variables, we utilize measures of political party membership and liberal-conservative ideology (both self-rated and calculated on the basis of 20 policy issue stances).¹²

Cultural Biases. To test the relations among perceptions of danger and the worldviews justifying *hierarchy*, *individualism*, and *egalitarianism*, we developed new measures to assess individual endorsement of three cultural biases.

Our hierarchy index embodies support for patriotism ("I'm for my country, right or wrong"), law and order ("The police should have the right to listen in on private telephone conversations when investigating crime"), and strict ethical standards ("I think I am stricter about right and wrong than most people"). It also expresses concern about the lack of discipline in today's youth and supports the notion that centralization is "one of the things that makes this country great."¹³

Our index for the cultural bias of individualism expresses support for continued economic growth as the key to quality of life, and private profit as the main motive for hard work. It espouses the view that democracy depends fundamentally on the existence of the free market, and argues that "the welfare state tends to destroy individual initiative." The individualism scale also indicates support for less government regulation of business, and endorses private wealth as just rewards for economic endeavor: "If a man has the vision and ability to acquire property, he ought to be allowed to enjoy it himself."¹⁴

Our measure of egalitarianism is based on survey items written to assess attitudes toward

equality of conditions. The egalitarianism scale centers on political solutions to inequality: "Much of the conflict in this world could be eliminated if we had more equal distribution of resources among nations," "I support federal efforts to eliminate poverty," and "I support a tax shift so that the burden falls more heavily on corporations and persons with large incomes." The egalitarianism index also covers perceived abuses by the other political cultures: "Misuse of scientific and expert knowledge is a very serious problem. . ." and "The human goals of sharing and brotherhood are being hindered by current big institutions. . ."¹⁵

There are many theories that might account for the perceptions of risks, from those based on knowledge, personality, or economics, to those based on politics or culture. Our task is to discriminate among these rival theories by comparing their power to predict who fears what and why.

CULTURAL BIASES BEST PREDICT RISK-PERCEPTION FINDINGS

If it were true that the more people know about technological risk, or about technology in general, the more they worry about it, it should follow that risk perception goes along with such knowledge. Using the measure of self-rated knowledge about technologies, and self-rated education, we see quite the opposite.

Our findings show that those who rate their self-knowledge of technologies highly also tend to perceive greater average benefits associated with technologies than those who are less confident about their knowledge.¹⁶ Those who report higher levels of education tend to perceive less threat from the risks of war. Otherwise, self-rated knowledge and education bear only weak (that is, statistically insignificant) relations to preferences for societal risk taking or to perceived risks associated with technol-

ogy and the environment, social deviance, and economic troubles.

The more an individual's annual fatality estimates correspond to expert estimates, in addition, the more likely that person is to rate other risks as small—at least compared with those who are less accurate. While on the whole those who are more in accord with expert mortality estimates perceive less risk, they are also less optimistic regarding the benefits of technology. *Overall, the conclusion is compelling that self-rated knowledge and perceptual accuracy have a minimal relationship with risk perception.*

With regard to personality, we find that those who feel our society should definitely take technological risks can be described as patient, forbearing, conciliatory, and orderly (i.e., the pro-risk measure is positively correlated with the personality traits "need for order" and "deference").¹⁷ Advocates of societal risk taking tend not to be aggressive, or autonomous, or exhibitionistic, but are more likely to be cautious and shy and to seek stability rather than change. *This pattern is suggestive of a technologically pro-risk personality, which emerges as that of an obedient and dutiful citizen, deferential to authority.* Such a personality structure fits extremely well with the political culture of hierarchy.

By contrast, those citizens who perceive greater risk in regard to technology and the environment tend to turn up positive on exhibitionism, autonomy, and need for change, but negative on need for order, deference, and endurance (i.e., just the opposite of those who score as favoring societal risk taking). *This technologically risk-averse pattern of personality traits also holds for those who endorse egalitarianism.*

Those who endorse egalitarianism are also more likely to be personally risk taking, but societally risk averse, while those who favor hierarchy tend to be personally risk averse, but societally pro-risk with respect to technology and the environment. Thus, *we find no evidence for a personality structure that is*

risk taking or risk averse across the board. Risk taking and risk aversion are not all of a piece, but depend on how people feel about the object of attention. Cultural theory would predict, for example, that hierarchists would be risk averse when it comes to taking risks with the body politic.

Relative to conservatives, those who rate themselves as liberals tend to be technologically risk averse at the societal level, are more likely to rate the risks of technology and the environment as very great, and are comparatively unconcerned about the risks of social deviance. As the self-rating of liberal increases, the average ratings for the risks of the 25 specific technologies increases, and the average ratings of their benefits decreases.

Political party membership is less predictive of risk perceptions and preferences than left-right ideology, especially on the Democratic side (undoubtedly because Democrats are the more heterogeneous party). When we ask what it is about thinking of oneself as a liberal or a conservative that makes such a big difference compared with thinking of oneself as a Democrat or a Republican, the findings are informative. Whether by self-rating or policy designation, *liberals have strong tendencies to endorse egalitarianism* ($r = 0.52$ and $r = 0.50$), *and to reject hierarchy* ($r = -0.55$ and $r = -0.51$) *and individualism* ($r = -0.37$ and $r = -0.31$). Likewise, membership in the Democratic party is correlated with egalitarianism ($r = 0.30$), but is not predictive of agreement or disagreement with the hierarchical or individualist point of view. *Republicans have a penchant toward individualist* ($r = 0.31$) *and hierarchical biases* ($r = 0.40$), *and an equally strong proclivity for rejecting egalitarianism* ($r = -0.45$). These correlations among political party membership, left-right ideology, and cultural biases are huge by the standards of survey research.

How does cultural theory compare with other approaches to perceived risk? *Cultural biases provide predictions of risk perceptions and risk-taking preferences that are more pow-*

erful than measures of knowledge and personality and at least as predictive as political orientation. We find that egalitarianism is strongly related to the perception of technological and environmental risks as grave problems for our society ($r = 0.51$), and hence to strong risk aversion in this domain ($r = -0.42$). Egalitarianism is also related positively to the average perceived risks, and negatively to the average perceived benefits, of 25 technologies. One could hardly paint a worse picture of technology—little benefit, much risk, and the risks not worth taking.

Individualist and hierarchist biases, in contrast, are positively related to a preference for technological risk-taking ($r = 0.32$ and $r = 0.43$) and to average ratings of technological benefits ($r = 0.34$ and $r = 0.37$). Here the image is more sanguine: the benefits are great, and the risks small, so society should press on with risk taking to get more of the good that progress brings with it.

DISCUSSION

We have shown that whether measured by cultural biases or by political orientation, perceptions of technology are predictable given the worldview of the perceiver. But one should not conclude that the establishment cultures of individualism and hierarchy always favor risk taking, or that egalitarians are always risk averse. *Perception of danger is selective; it varies with the object of attention.* For we find that compared with advocates of egalitarianism, those in greater agreement with individualism perceive greater risk in respect to war ($r = 0.15$ versus $r = 0.40$ respectively). Likewise, it is the hierarchical bias that is most highly correlated with perceived threat of social deviance ($r = 0.35$ compared with $r = 0.15$ for egalitarianism). Nor is it always the adherents of establishment cultures versus those of egalitarianism. As predicted by cultural theory, *it is not that devotees of individualism and hierarchy perceive no dangers in general,*

but that they disagree with those who favor egalitarianism about how dangers should be ranked. Just as technological and environmental risks are most worrisome to egalitarians, social deviance is deemed most dangerous to hierarchists, and the threat of war (which disrupts markets and subjects people to severe controls) is most feared by individualists.

It is obvious that culture neither causes nor influences demographic characteristics such as gender or age (though it may influence their social meanings). Thus we do not argue that the weak correlations we find between cultural biases and personal attributes like income or social class reveal the influence of political culture on those variables. Whether we look at knowledge, personality, political orientation, or demographic variables, however, we find that cultural theory provides the best predictions of a broad range of perceived risks and an interpretive framework in which these findings cohere.

The importance of using a wide range of risks in studying how people perceive potential dangers should now be apparent. Employing only dangers from technology, while better than nothing, is far less powerful than considering a panoply of dangers from the threat of war to social deviance to economic collapse. Broadening the spectrum of related questions to be considered allows for more discriminating tests of rival theories. With perceived dangers from technology as the only issue, moreover, one cannot tell whether the level of concern registered by an individual comes from aversion to or acceptance of risk in general, or is evoked differentially by various risks. By observing whether there is a variegated pattern of risk perception (now we know there is) and by ascertaining who rates each kind of risk in which way, we may study *patterns of risk perception.* Fitting these patterns to alternative explanations, we believe, is a superior test of competing theories.

Comparing rival theories, not just a single explanation, has similar advantages. Making the rival theories confront each other reduces

the temptation to claim easy victories. It is not enough to show respectable correlations; it is also necessary to do better than the alternatives.

Viewed in this light, the cultural theory's greater power than alternative explanations is manifest in its ability to *generate* broader and finer predictions of who is likely to fear, not to fear, or fear less, different kinds of dangers. Having derived from cultural theory a number of explanations approximated in our findings, the next question is what this tells us about risk perception.

Our findings show that it is not knowledge of a technology that leads people to worry about its dangers. In the current sample, the difference between public and technical estimates of annual fatalities ranges up to several orders of magnitude in size. The enormous variation in these public perceptions is not accounted for by knowledge, leaving considerable room for other explanations. Indeed, if people have little knowledge about technologies and their risks, then public fears can hardly coincide with how dangerous various technologies have proved to be.

Wait a minute! Everyone knows that nuclear radiation and AIDS can kill. We agree. When these subjects become politicized, however, disagreement develops along the fault lines of policy differences, seizing upon whatever cracks of uncertainty now exist: What are the health consequences of prolonged exposure to low levels of radiation? Is there such a thing as an amount of radiation so small that exposure causes no harm? Can AIDS be passed along by social contact? Should sufferers from AIDS be quarantined? Should their sexual contacts be traced and informed?

Our findings on personality raise the question of why there are such interesting sets of correspondence among traditionally assessed traits and cultural biases. Part of the difficulty in interpreting these findings is that personality entails such a wide set of characteristics—from intrapsychic to interpersonal relations—that virtually no aspect of individ-

ual life is left out. Were there theories connecting particular aspects of personality to patterns of risk perception, interpretation would be easier, for then we could test these hypotheses. One possibility is that personal orientations may guide individuals to make commitments consistent with specific political cultures, while at the same time, cultures may select from among individuals those that support their way of life. Since there are no such theories, however, we are left to explore among personality characteristics to see what fits.

Assuming both personality and political culture are operative, which is more powerful in predicting perceptions of danger and preferences for risk taking? Clearly, the closer one gets to asking questions about policy preferences, the better one's predictions of the selective perceptions of danger should be. Since our measures of cultural biases are closer to public policy than traditional measures of personality are, we should expect our measures (other things being equal) to predict better. And they do. But if that were all there were to prediction—proximity of the explanation to the explained—then we would expect assessments of political ideology to predict risk preferences far better than cultural bias does. As we have shown, however, public policy stances and self-rated political orientation do not do as well as cultural biases in predicting risk preferences and perceptions—even though they are the most proximal to risk policy of all the variables we test.

How then do cultural biases, which are so remote from the evidence regarding risks, guide people in choosing what to fear? A detailed answer is presented in *Risk and Culture*. Here, we can say only that hierarchists favor technological risk taking because they see this as supporting the institutions that they rely on to make good their promises, to wit: technology can promote a stronger society and a safer future provided that their rules (and stratified social relations) are maintained. Individualists also deem technology to be good. They hold that following market principles (and

individually negotiated social relations) will allow technological innovation to triumph, conferring creative human value on otherwise inert resources. They also believe that the enormous benefits of technological innovation will convey their premise that unfettered bidding and bargaining leaves people better off. If they believed that free market institutions are intrinsically ruinous to nature, individualists could no longer defend a life of minimum restraints. By the same token, egalitarians are opposed to taking technological risks because they see them as supporting the inegalitarian markets and coercive hierarchies to which they are opposed.

By this time readers are right to wonder, in view of the assertions we are making, whether other surveys support our claims. A recent one to come to our attention is supportive in many ways. Its subject is the irradiation of food as a preservative process, widely considered safe by scientists, but a topic of considerable worry to concerned consumers. The participants were 195 adult women chosen from Pennsylvania women's groups of various kinds—religious, civic, professional, social, and political. The respondents were given a questionnaire to fill out, then were shown different kinds of information about food irradiation, then filled out another questionnaire, and finally were engaged in group discussion. The authors, Richard Bord and Robert O'Conner, find, as we do, that knowledge (based on the information given to participants) is inversely related to fear of a technology: "Having accurate knowledge about the food irradiation process translates into greater acceptance." They add significantly that:

whether respondents received a technical or non-technical communication about the food irradiation process and whether they received a detailed discussion of the major arguments for and against food irradiation had no discernible effect on their judgments.

It is not knowledge per se, but confidence in

institutions and the credibility of information that is at issue:

Trust in business and industry in general, the food irradiation industry specifically, government regulators, and science as a provider of valid and useful knowledge is the major predictor of whether the respondent indicates she will or will not try irradiated food. . . . Learning that others have used food irradiation safely and of its approval by prestigious professional organizations enhanced its acceptability. . . . People who oppose big government and big business express greater fear of radiation.

[One of the main topics of group discussion] was the respondents' view that complex technology bears a burden of too much uncertainty, too much greed on the part of its sponsors, and too little effective governmental control. The point was frequently made that even if the scientific-technical plan was flawless the people executing the plan and managing the technology would inevitably create serious problems.¹⁸

It is not only that "the facts" cannot by themselves convince doubters, but that behind one set of facts are always others relating to whether business and government can be trusted.

If there are any people to whom knowledge about hazards should make the most difference, it is those who are professionally employed in the analysis and management of risk. Yet a survey of risk professionals drawn from government, industry, environmental groups, and universities shows something dramatically different. Thomas Dietz and Robert Rycroft find that self-reported ideology:

appears to have the strongest links to environmental attitudes and values of risk professionals. . . . For example, on the question of whether we are seeing only the tip of the iceberg with regard to technological risk, 88.5 percent of [the] very liberal . . . agreed . . . as did 74 percent of [the] liberals. Only 25 percent of [the] very conservative and 36.4 percent of [the] conservative respondents agreed.¹⁹

The more perceptions of contested subjects are studied, we believe, the more they will reveal the strong influence of cultural biases. In this respect, Paul Sabatier and S. Hunter's

recent study of causal perceptions in belief systems is especially useful because, like the present analysis, it focuses on perceptual biases from more than one cultural direction:

Environmentalists perceived water clarity to be getting worse, while those in favor of economic growth and property rights simply refused to believe the wealth of documented, and widely diffused, scientific evidence developed by one of the world's leading limnologists demonstrating statistically significant declines in water clarity over the previous 10–15 years. This suggests that in high-conflict situations, perceptions on even relatively straightforward technical issues can be heavily influenced by elites' normative presuppositions.²⁰

This position reaffirming the importance of worldviews is bolstered by the "risk and benefit perceptions, acceptability judgments, and self-reported actions toward nuclear power" spoken of by Gerald Gardner and his coauthors. Their respondents were taken from environmental groups, blue-collar workers, college students, businesspeople, and technologists (scientists and engineers employed by a utility company). While education, sex, gender, religion, and other sociodemographic variables were not related to protests or other personal actions taken on nuclear power, Gardner et al. found that liberal-conservative ideology was predictive: "The most important correlate of reported action and 'acceptability' . . . appeared to represent a 'liberal/public interest group vs. a conservative/private enterprise' dimension."²¹

The power of the ideological explanation is strengthened further by Stanley Rothman and S. Robert Lichter, who analyzed questionnaires filled out by a sample of 1,203 congressional staff, civil servants, television and print journalists, lawyers, officials of public interest groups, moviemakers, military officers, energy and nuclear power experts. The results vary widely by group membership, with 98.7 percent of nuclear energy experts thinking nuclear power plants are safe, compared with only 6.4 percent of public interest offi-

cial, and 30.6 percent of journalists on television networks. Their major finding is that compared with a variety of demographic, social, and economic variables, political ideology was by far the most powerful predictor. "We hypothesize," they conclude, "that nuclear energy is a surrogate issue for more fundamental criticism of U.S. institutions."²² This restates the thesis of *Risk and Culture* for nuclear technology.

Whenever other studies present comparable findings, they reveal that the most powerful factor for predicting risk perceptions is trust in institutions or ideology, which is largely about which institutions can be trusted. *Such findings show that, however conceptualized—whether as political ideology or cultural biases—worldviews best account for patterns of risk perceptions.*

In summary, the great struggles over the perceived dangers of technology in our time are essentially about trust and distrust of societal institutions, that is, about cultural conflict. Once we vary the object of concern, we do indeed discover that egalitarians (who fear social deviance less than hierarchists and individualists) fear technology a great deal—seeing in it, or so the cultural theory claims, the corporate greed they believe leads to inequality. Individualists, who believe in competition, and who are exceedingly loathe to place restraints on what they consider to be mutually profitable relationships, deem technology to be good. In contrast, hierarchists, who fear disorder and erosion of status differences, are more worried about social deviance and less worried about technological dangers than egalitarians.

We have shown that other surveys, with different assumptions, methods, and sample populations find, as we do, that risk perceptions and preferences are predictable given individual differences in cultural biases. It is the congruence of our analysis with others' that gives us the most confidence in our findings. We would have preferred to ask more subtle and differentiated questions about

knowledge; but the other surveys we cite do that, and they also show the importance of cultural biases. Above all, we would have preferred more elaborate statistical analysis than small samples permit.²³

Knowing what sorts of perceptions come from which kinds of people may allow for practical applications of cultural theory in a variety of policy contexts. Risk communication programs, for instance, might profitably focus on the underlying causes of risk perception—such as confidence (or lack of trust) in institutions, or the credibility of hazard information—rather than only on “the facts” regarding possible harms. Since cultural theory generates clues to the propensities of those with various worldviews to underestimate or overestimate specific kinds of risk, in addition, it can be used to tailor educational programs—say cigarette and alcohol warnings—to the plural rationalities represented in the general public.

It has been two decades since Chauncy Starr's seminal essay “Social Benefit versus Technological Risk” asked how much our society is willing to pay for safety.²⁴ Since then, a lively and spirited research community has grown up around the issues of technological risks.²⁵ We hope to have pointed the study of risk perception in the right direction by: (1) expanding the scope of the questions asked to include patterns of risk perception (not only technological hazard, but also war, social deviance, economic decline, etc.); and by (2) comparing rival explanations of public fears. As predicted by cultural theory, we find that individuals perceive a variety of risks in a manner that supports their way of life.

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- 7 Cultural theory delineates two additional cultures: fatalists and hermits; it also makes finer distinctions regarding nature, technology, and risk perception than are discussed here. Were it possible, we would prefer to measure cultural biases in their social context. Instead,

we have taken the approach suggested by the survey data at our disposal. We assess cultural biases as worldviews.

⁸ Intensive assessments of 300 ordinary citizens were conducted, including measures of perceptions of technologies, preferences for societal decision approaches and societal risk policy, confidence in institutions, sociotechnological and political orientations, personal values, environmental dispositions, self-descriptions personal background, and more.

Two public samples were drawn from cities in the East Bay area of the San Francisco region: Richmond, Oakland, Piedmont, and Alameda. Stratified samples were selected on the basis of an analysis of social trends that provided detailed information regarding the median demographic characteristics of each postal zip code in the sample region. Participants were recruited via telephone directory sampling, letter of invitation, and telephone follow-up. Most, but not all, of the current findings are based on analysis of sample 2 (which had 134 participants), leaving sample 1 (which had 166 participants) available for replication of this study.

⁹ Participants rated how risky, and how beneficial, they judged each of 25 technologies to be: refrigerators, photocopy machines, contraceptives, suspension bridges, nuclear power, electronic games, diagnostic X rays, nuclear weapons, computers, vaccinations, water fluoridation, rooftop solar collectors, lasers, tranquilizers, Polaroid photographs, fossil electric power, motor vehicles, movie special effects, pesticides, opiates, food preservatives, open-heart surgery, commercial aviation, genetic engineering, and windmills. See Baruch Fischhoff, Paul Slovic, Sarah Lichtenstein, Stephen Read, and Barbara Coombs, “How Safe is Safe Enough? A Psychometric Study of Attitudes toward Technological Risks and Benefits,” *Policy Sciences* 9 (1978): 127–52.

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¹⁴ Quotations, in order, are from Eysenck, 155, and from Fergusson, 224.

¹⁵ Quotations concerning a tax shift and the elimination of poverty are from Costantini and Craik; the balance are from Buss, Craik, and Dake, 1982.

¹⁶ We report correlations throughout this essay, not means or mean differences. For sample 1 (134 participants), a correlation must be greater than 0.15 or less than –0.15 to be statistically significant. Nothing about average scores or group comparisons is implied.

¹⁷ Gordon Allport, *Pattern and Growth in Personality* (New York: Henry Holt and Company, 1961); see also *Personality: A Psychological Interpretation* (New York: Henry Holt and Company, 1937).

¹⁸ Richard Bord and Robert O'Conner, “Risk Communication, Knowledge, and Attitudes: Explaining Reactions to a Technology Perceived as Risky,” (manuscript submitted for publication), quotations 14, 11–12, 14–15. Authors are at Pennsylvania State University.

¹⁹ Thomas Dietz and Robert Rycroft, *The Risk Professionals* (New York: Russell Sage Foundation, 1987), quotation 47.

²⁰ Paul Sabatier and S. Hunter, “The Incorporation of Causal Perceptions into Models of Elite Belief Systems,” *Western Political Quarterly* 42 (1989): quotation 253.

²¹ Gerald Gardner, Adrian Tiemann, Leroy Gould, Donald Deluca, Leonard Doob, and Jan Stolwijk, “Risk and Benefit Perceptions, Acceptability Judgments, and Self-reported Actions toward Nuclear Power,” *Journal of Social Psychology* 116 (1982): 116, quotations 194–95.

²² Stanley Rothman and S. Robert Lichter, “Elite Ideology and Risk Perception in Nuclear Energy Policy,” *American Political Science Review* 81 (1987): 81, quotation 395.

²³ Our findings call for multivariate statistical analysis of the interactions between cultural biases and the other classes of predictors. We are fully aware of the difficulties of regression or path analysis on small samples, so efforts are under way on larger samples. We are also sensitive to the fact that correlations do not necessarily imply causation. Cultural theory makes causal attributions, however, and the correlations we do find are consistent with its predictions.

²⁴ Chauncy Starr, “Social Benefit versus Technological Risk: What is Our Society Willing to Pay for Safety?” *Science* 165 (1969): 1232–38.

²⁵ National Research Council, Committee on Risk Perception and Communication, *Improving Risk Communication* (Washington, D.C.: National Academy Press, 1989).