

Cultural Understandings of Risk and the Tyranny of the Experts

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Every year, lawmakers and agency regulators, with the input of industry experts and scientists, make hundreds of decisions about how to regulate conduct and allocate resources to address various types of risks that threaten the well-being of American citizens. In fact, managing and minimizing risk is one of the most important tasks of today's policy makers. In spite of this fact, policy makers often take action without their systematically considering the preferences of the very people whose welfare is at stake. There are several reasons for this. The dominance of traditional risk analysis, with its emphasis on statistics and cost-benefit analysis, has influenced policy makers to downplay the role of values and subjectivity in risk management. The result has been that risk decisions have been based upon the erroneous assumption that empirical data and mathematical

calculations alone are adequate bases for risk decisions. Rarely do decision makers acknowledge that ex ante consideration of public sentiment is valuable. In fact, a number of scholars have argued that because individuals become emotional about potential harms, scientific experts should make all risk decisions without any public involvement at all. A consequence of the focus on traditional risk analysis is that no one has developed a comprehensive model of public risk perception. Existing theoretical perspectives and methodologies have not offered a comprehensive model, and each suffers from a limitation of one kind or another. This Article argues that lawmakers cannot adequately manage risks without understanding how members of the public view and react to these risks. In an effort to provide specific guidance for future risk decisions, the Article synthesizes past risk perception research and theory in order to offer a comprehensive risk perception model. This model should serve as a tool for risk managers and policy makers and as a catalyst for future normative risk management debate.

INTRODUCTION

The interaction between risk events and social processes makes it clear that . . . risk has meaning only to the extent that it treats how people think about the world and its relationships. Thus, there is no such thing as “true” (absolute) and “distorted” (socially determined) risk. Rather the information system and characteristics of public responses that compose social amplification are essential elements in determining the nature and magnitude of risk.¹

Risk should be seen as a joint product of *knowledge*² about the future and *consent* about the most desired prospects.²

Each day, Americans live with risk management laws and policies formulated by lawmakers who lack the most basic understanding of how Americans view and react to these risks. Although the United States was founded on the notion that individual citizens have the fundamental right to govern their own existence and make independent, informed choices, decisions about how to manage national security, pollutants in our water, speed limits, and health and safety standards in eating establishments and workplaces are decided by few on behalf of many. The allocation of responsibility for such decisions to a particular group of individuals is inevitable; few would

¹ Roger E. Kasperson et al., *The Social Amplification of Risk: A Conceptual Framework*, 8 RISK ANALYSIS 177, 181 (1988).

² MARY DOUGLAS & AARON WILDAVSKY, RISK AND CULTURE 5 (1982).

argue that every public risk decision should be put to a vote of the people. Nevertheless, decisions about how to manage risk—defined as the potential for harm from various sources—are inherently value-laden judgment calls. The very fact that risks are *potential* makes them unknowable, at least with any kind of certainty; their short- and long-term consequences are hard to gauge. Because it is impossible to address and eliminate all risks simultaneously, difficult decisions must be made with respect to which pose the most significant threat and which negative consequences are the most terrible. While expert analysis and prediction can give us best guesses as to how future events might unfold, expert analysis can neither anticipate human fear nor evaluate to determine objectively which of two harms with equivalent expected costs is worse. This Article synthesizes past research and theory in the area of individual and public risk perception to derive a model of risk perception that may serve as a tool for risk managers and lawmakers in understanding how individuals think about, comprehend, and evaluate risks.

Although daily life and governance³ involve myriad decisions, choices about how to respond to risks are some of the most important decisions human beings make. From the home buyer evaluating the terms of a loan to the lawmaker deciding whether to vote for a declaration of war, individuals make risky decisions in a seemingly infinite variety of contexts. Moreover, when evaluating the potential for future harm, the choices we make often have profound implications for future outcomes, including those affecting generations to come.

Human comfort and survival are not the only considerations implicated by our choices. Recently, there has been a growing awareness of how our actions impact the earth, air, water sources, and plant and animal life. Risky decisions influence many facets of life and involve gauging outcomes that are difficult to predict, even with reasonably good data, making the wisdom of any particular course of action speculative. And yet, it is impossible to avoid making these difficult choices. Once a threat has been identified, failure to set a course of action is usually a choice in and of itself.

³ “Simply put ‘governance’ means: the process of decision-making and the process by which decisions are implemented (or not implemented).” *What is Good Governance?*, UNITED NATIONS ECON. & SOC. COMM’N FOR ASIA AND THE PACIFIC, <http://www.unescap.org/pdd/prs/projectactivities/ongoing/gg/governance.asp> (last visited Sept. 30, 2011).

Although there is an abundance of literature on how risks should be measured, managed, controlled, and calculated, surprising little has been written on how stakeholders—individuals who are affected by potential harms—evaluate and react to potential threats. When risk management proposals are advanced, they are usually presented exclusively in terms of probabilities and costs. To a great extent, factors exogenous to the conscious decision task, such as human emotion and cognitive processes, are ignored. Decision tasks are treated as if there is a correct answer upon which all could agree, if only complete data were available. Rarely is risk understood as a culturally defined force, interpreted by human beings who bring their own understandings and preferences to the table. However, recent empirical and theoretical contributions from sociology, psychology, and anthropology make it clear that the very act of perceiving and evaluating a danger is a complex, multifaceted process. Several theoretical and empirical perspectives on risk perception have been offered by influential thinkers such as Paul Slovic, Roger Kasperon, Baruch Fischhoff, Sarah Lichtenstein, Ulrich Beck, and Mary Douglas, among others. Nevertheless, research on how individuals think about risk has failed to converge on a comprehensive model of risk perception. In part, this failure has arisen because discussions have emphasized *either* the specific characteristics of the risks *or* the social mechanisms underlying public panics. Analysis of the interaction of these two aspects of risk perception is sparse.⁴ Although each of the various primary approaches to our investigating and understanding risk perception makes important contributions, to date, there has not been an attempt to draw wisdom from the collective scholarship.⁵

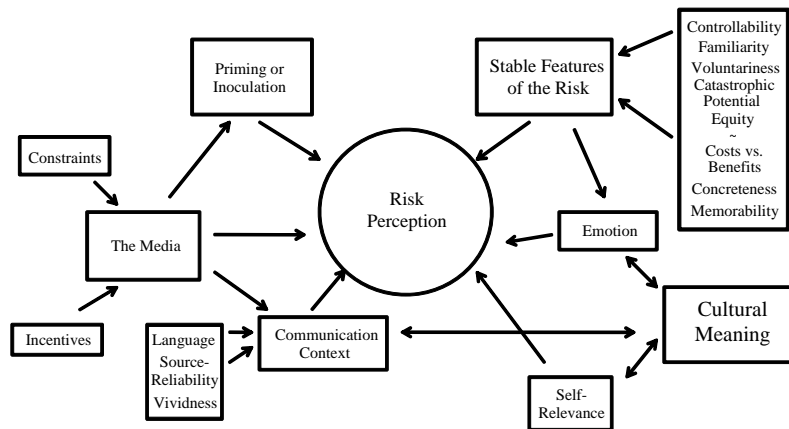
This Article synthesizes the collective wisdom from psychology, sociology, anthropology, political science, and law to derive a model

⁴ The exception is Kasperon et al., *supra* note 1, which is an important work but is subject to a number of shortcomings discussed *infra* Part I. Another major work of great influence is PAUL SLOVIC, *THE PERCEPTION OF RISK* (2000).

⁵ Instead, commentators have attempted to compare and contrast various methodologies and theories in an effort to arrive at a consensus as to which of the approaches is most useful. See, e.g., Claire Marris et al., *A Quantitative Test of the Cultural Theory of Risk Perceptions: Comparison with the Psychometric Paradigm*, 18 RISK ANALYSIS 635, 635 (1998) (finding that “[t]he qualitative risk characteristics generated by the psychometric paradigm explained a far greater proportion of the variance in risk perceptions than cultural biases”); see also Lennart Sjöberg, *Are Received Risk Perception Models Alive and Well?*, 22 RISK ANALYSIS 665 (2002) (arguing that recent scholarship touting cultural and psychometric risk analysis approaches have been inappropriately optimistic about the approaches).

that includes the most important factors to consider in predicting how members of the public will evaluate risks. A primary aim of this Article is to broaden and deepen the scope of our understanding of risk perception by synthesizing various risk perception theories. Ultimately, the goal is to create a single set of criteria that can be used to understand when, and under what conditions, human beings become concerned about particular risks. The hope is that this model will serve as a tool for risk managers and a springboard for future normative discussion of public risk management.

The Article proceeds in four parts. Part I describes the current risk climate, noting the rising concern over modern risks created by advances in science and technology. Part II explains the primary contributions to the risk perception literature, examining each of the major theoretical perspectives to date. Part III draws on these existing perspectives to derive a list of the most important considerations for risk perception and introduces several new contributions. Part IV addresses the major considerations from Part III, synthesizing the major work from Part II in order to provide a comprehensive model that includes risk-amplifying and attenuating factors.⁶ I conclude by proposing a risk-perception model illustrated by the following chart:



⁶ The notion that risk can be amplified and attenuated was most prominently featured in the seminal paper authored by Roger Kasperson and colleagues, entitled, *The Social Amplification of Risk: A Conceptual Framework*, *supra* note 1.

I

THE NATURE OF MODERN RISKS: WHY WE WORRY

Policy makers and individual Americans make risk decisions on a daily, and sometimes even minute-to-minute, basis. It is impossible to think about crime, the environment, food safety, foreign relations, medical research, consumer protection, traffic laws, economic policy, or food production without also thinking about risk.⁷ So much of law and policy is driven by current wisdom regarding risk management, that much of the time, risk management considerations are implicit in the debate. Risk decisions are never value neutral: they are determined by preferences, shaped by affective reactions, and influenced by cognitive and cultural biases, although that is not always acknowledged. Engaging in the metacognition necessary in order to understand human threat responses can be uncomfortable. Arguably, this uneasiness explains why so much of risk analysis relies on formulaic cost-benefit analysis while avoiding fundamental questions about how our risk responses satisfy human emotional and intellectual requirements.

In addition to psychological obstacles, fluctuations in the risk landscape cause challenges to risk managers and the lay public alike. The most significant obstacles facing human beings have changed over time as our resources and technologies have evolved. As Paul Slovic has pointed out:

In recent decades, the profound development of chemical and nuclear technologies has been accompanied by the potential to cause catastrophic and long-lasting damage to the earth and the life forms that inhabit it. The mechanisms underlying these complex technologies are unfamiliar and incomprehensible to most citizens. Their most harmful consequences are rare and often delayed, hence difficult to assess by statistical analysis and not well suited to management by trial-and-error learning.⁸

⁷ See John D. Graham, *Historical Perspective on Risk Assessment in the Federal Government*, 102 *TOXICOLOGY* 29, 33–35 (1995) (explaining that carcinogens traditionally have been seen to lack safety “thresholds” and describing how this no-threshold view prompted regulatory agencies to adopt “individual risk” tests); Dennis J. Paustenbach, *Retrospective on U.S. Health Risk Assessment: How Others Can Benefit*, 6 *RISK: HEALTH, SAFETY & ENV'T* 283, 284 (1995) (“[O]ver 300 of about 5,000 chemicals routinely used in industry have been labeled carcinogens as a result of animal studies.”); see also Lynn J. Frewer et al., *Communicating About the Risks and Benefits of Genetically Modified Foods: The Mediating Role of Trust*, 23 *RISK ANALYSIS* 1117 (2003).

⁸ Paul Slovic, *Perception of Risk*, 236 *SCIENCE* 280, 280 (1987).

The German sociologist Ulrich Beck notes that we have moved from a culture of scarcity to a culture of risk.⁹ Today, in Western societies, more people than ever before have their basic needs met.¹⁰ Since the early 1900s, an increase in resources devoted to researching and developing medicines, methods of food production, and novel synthetics have dramatically increased the standard of living for most.¹¹ In the United States, citizens benefit tremendously from innovative technologies, some of which not only improve the quality of life, but also extend our lives and improve our health. These technologies, however, come with associated risks, some of which are devastating and many of which are not discovered until after a technology has gained general acceptance and widespread use. The focus has shifted from concern about a lack of resources to the promulgation of dangers in medicines, food sources, the environment, and consumer products.¹² America, along with other Western cultures, has arguably become risk obsessed.¹³ Commentators have noted the prevalence of fear in our culture.¹⁴ Political scientist Aaron Wildavsky famously remarked, “How extraordinary! The richest, longest-lived, best-protected, most resourceful civilization, with the highest degree of insight into its own technology, is on its way to becoming the most frightened.”¹⁵

⁹ See ULRICH BECK, *RISK SOCIETY: TOWARDS A NEW MODERNITY* 26 (1992).

¹⁰ See Kenneth E. Boulding et al., *From Abundance to Scarcity: Implications for the American Tradition*, THE HAMMOND LECT. SER. (1978) (“[T]he developed countries of North America, Europe, Japan, and Australia clearly consume considerably more than half of these resources, but they have less than a quarter of the world’s population.”).

¹¹ See Stephen D. Oliner & Daniel E. Sichel, *The Resurgence of Growth in the Late 1990s: Is Information Technology the Story?*, 14 J. ECON. PERSP. 3, 4 (2000).

¹² See BECK, *supra* note 9, at 19.

¹³ See David L. Altheide, *The News Media, the Problem Frame, and the Production of Fear*, 38 SOC. Q. 647, 664–65 (1997). Altheide notes,

The perception of many is that life is very problematic, dangerous, and demanding of extreme measures to protect us. Indeed, one of the few things Americans seem to share is the popular culture that celebrates danger and fear as entertainment organized with canned formats delivered through an inexpensive and invasive information technology.

Private life is closer to public concerns and issues than ever before. This is because both wear the look of popular culture. And this looks like fear.

Id.

¹⁴ See generally H. AARON COHL, *ARE WE SCARING OURSELVES TO DEATH?: HOW PESSIMISM, PARANOIA, AND A MISGUIDED MEDIA ARE LEADING US TOWARD DISASTER* (1997).

¹⁵ Aaron Wildavsky, *No Risk Is the Highest Risk of All*, 67 AM. SCIENTIST 32, 32 (1979).

If Americans seem paralyzed with fear, it may be because of the nature of the risks we face today. Increasingly, the American populace perceives that it is at risk from an onslaught of potential dangers that threaten health and well-being.¹⁶ Whereas famine, disease, and natural disasters plagued past generations of human beings, today's populations face increasingly diverse threats. The development of myriad novel technologies, along with often lagging understanding of the full complement of accompanying consequences, means that society is often fully engaged with a product or process before discovering its risks.¹⁷ Threats to health and well-being are often difficult to detect, being invisible to the naked eye, odorless and tasteless, or originating in a distant location.¹⁸ Moreover, the impact of some of the harms we face today, such as nuclear weapons and environmental degradation, are profound and far-reaching—to the next generation and beyond.¹⁹ Beck notes that “in the modernization process, more and more *destructive* forces are also being unleashed, forces before which the human imagination stands in awe.”²⁰ The evolution of science and technology, and our shifting focus from production of goods to protection of health and environment, has brought a new awareness of risk in individuals. Individuals are more aware of risks, think more about them, engage in more self-education, have more opinions about

¹⁶ See DOUGLAS & WILDAVSKY, *supra* note 2, at 2, 44 (1987) (citing Louis Harris & Associates, *Risk in a Complex Society* (public opinion survey conducted by Marsh & McLennan Companies, New York, 1979)). These data are clearly outdated, but more recent data suggest a continuing trend in a similar direction. See also Jonathan Simon, *Risk and Reflexivity: What Socio-Legal Studies Add to the Study of Risk and the Law*, 57 ALA. L. REV. 119, 121–22 (2005) (discussing some historical examples of how Americans have become inflamed with fear over one risk or another).

¹⁷ See Slovic, *supra* note 8.

¹⁸ See Roger E. Kasperson & Jeanne X. Kasperson, *The Social Amplification and Attenuation of Risk*, 545 ANNALS AM. ACAD. POL. & SOC. SCI. 95, 96 (1996).

The familiar scourges of famine, disease, and pestilence no longer dominate the risk experience, which, instead, now involved negotiating a new and perplexing array of global threats associated with modern armaments, chemicals and radiation often invisible to the senses, contaminants whose effects surface only after decades or generations, hazards created by peoples and technologies in distant parts of the globe, and harms arising from the flow and control of information.

Id.

¹⁹ See BECK, *supra* note 9, at 22 (“Atomic accidents are accidents no more in the limited sense of the word ‘accident’. They outlast generations.” (internal parenthetical omitted)).

²⁰ *Id.* at 19.

them, are more emotionally and financially invested in managing risk, and therefore desire to and ought to have an increasing role in deciding how large-scale risk decisions are made.

Given our culture of anxiety, continuing in our current state of relative ignorance about how members of society perceive risk will have at least two negative implications. The first implication is that, as things stand, law and policy makers are seriously flawed in their predictions about how members of the public will react to risks. The result is that the public is increasingly disenchanted with government, distrustful of industry, and scornful of politicians' reassurances. Disillusionment has a variety of negative consequences, ranging from apathy at the polls to civil unrest. Moreover, suspicion of the various decision-making bodies entrusted with the safety and well-being of the citizenry results in fear, and a fearful public is more easily manipulated and controlled by actors who use divisive and destructive tactics.²¹

The second implication of maintaining the ignorance about risk perception is that without input from members of the public, decisions made for members of the public will inevitably be flawed.²² Risk calculations—such as which benefits are outweighed by which risks—are judgment calls and are invariably subjective. Accordingly, decisions by a few on behalf of many, without consideration for the preferences of those affected, are a form of tyranny. Good governance requires inclusivity.

Some have argued that the public is ill-equipped to make valid assessments about risk because average citizens are prone to cognitive error and bias.²³ Law scholar Donald Hornstein strenuously rejects this argument as a basis for limiting the role of the public in risk decisions. Hornstein points out that scientists themselves are subject to inevitable uncertainties, flawed methods, and industry bias.²⁴ He further argues that subordination of public views to governmental risk

²¹ Christina E. Wells, *Questioning Deference*, 69 MO. L. REV. 903, 929 (2004) (“[T]he public may fall prey to skewed risk assessment as a result of private availability entrepreneurs’ attempts to fan fear regarding particular threats.”).

²² The argument that personal preferences about risk have value and must be part of the risk decision quotient is made in substantially greater detail *infra* Part III.

²³ That members of the public are prone to mistakes during decision tasks is a theme of law scholar Cass Sunstein’s work. *See, e.g.*, Timur Kuran & Cass R. Sunstein, *Availability Cascades and Risk Regulation*, 51 STAN. L. REV. 683 (1999).

²⁴ Donald T. Hornstein, *Reclaiming Environmental Law: A Normative Critique of Comparative Risk Analysis*, 92 COLUM. L. REV. 562, 610–16 (1992).

assessments is undemocratic.²⁵ Finally, Hornstein stresses that there are rational bases for citizens' risk evaluations; even when they might not comport with statistical probabilities, they reflect legitimate personal preferences.²⁶

II

CURRENT THEORETICAL PERSPECTIVES ON RISK RESPONSE

The comprehensive model of risk perception offered in this Article draws on the major risk perception theories developed thus far. These theories or methodologies include traditional risk analysis, psychometric study of risk perception, social amplification of risk theory, availability cascade theory, and the cultural evaluator theory. Each theoretical perspective adds an important set of considerations and is worthy of inclusion in the final model. Some of these approaches have important shortcomings. Others make significant contributions but do not go far enough toward elucidating a predictive model.

The oldest and most influential approach is traditional risk analysis. This approach is distinctly expert-centered, relies upon statistical and mathematical calculations, and involves cost-benefit analysis.²⁷ More recently, the psychometric method—an individual-centered approach to risk evaluation—was pioneered by Baruch Fischhoff, Paul Slovic, Sarah Lichtenstein, Stephen Read, and Barbara Combs.²⁸ These scholars, along with their colleagues, solicited the opinions of ordinary Americans regarding various sources of risk and attempted to make generalizations about what

²⁵ *Id.* at 611–12.

²⁶ *Id.* at 610–16. This view is similar to that of Dan Kahan. See Dan M. Kahan, *Two Conceptions of Emotion in Risk Regulation*, 156 U. PA. L. REV. 741 (2008); see also discussion *infra* Part II.E.

²⁷ Cost-benefit analysis can be defined as “a strategy for choice in which weightings are allocated to the available alternatives, arriving at some kind of aggregate figure for each major option.” Martha C. Nussbaum, *The Costs of Tragedy: Some Moral Limits of Cost-Benefit Analysis*, in COST-BENEFIT ANALYSIS: LEGAL, ECONOMIC, AND PHILOSOPHICAL PERSPECTIVES 169, 192 (Matthew D. Adler & Eric A. Posner eds., 2001); see also Richard A. Posner, *Cost-Benefit Analysis: Definition, Justification, and Comment on Conference Papers*, 29 J. LEGAL STUD. 1153, 1153 (2000) (“The term ‘cost-benefit analysis’ has a variety of meanings and uses. At the highest level of generality, . . . it is virtually synonymous with welfare economics, that is, economics used normatively—used, that is, to provide guidance for the formation of policy, either public . . . or private.” (internal citation omitted)).

²⁸ See Baruch Fischhoff et al., *How Safe Is Safe Enough? A Psychometric Study of Attitudes Towards Technological Risks and Benefits*, 9 POL. SCI. 127, 128 (1978).

characteristics of risk cause people particular concern. A decade after the seminal psychometric paper, Roger Kasperson joined with Ortwin Renn, Slovic, and several others to develop a new model that included the dynamic processes of risk communication and interpretation. The result, social amplification of risk (SAR), predicted that individuals would experience increasing (amplifying) or decreasing (attenuating) concern depending upon potential for events to trigger concern over possible future harm.

A related but fundamentally normative explanation of risk perception, advanced by Timur Kuran and Cass Sunstein, explained public panics as a result of availability cascades.²⁹ Availability cascades, according to Kuran and Sunstein, result when cognitively available (easily accessible) examples of an outcome lead people to overestimate the prevalence of a risk or the likelihood of a negative outcome.³⁰ Social discourse can exacerbate this phenomenon, creating a “snowball” effect that results in growing concern among members of the public. Kuran and Sunstein use their theory to call for a smaller role for the public in risk management and to advocate for an even larger role for the expert in risk decisions.

Dan Kahan’s cultural evaluator model, on the other hand, draws on the work of Mary Douglas, who viewed emotional (i.e., nonrational) reactions to risk as manifestations of culturally shaped (and valuable) expressions of underlying worldviews. Kahan, like Hornstein, advocates a greater role for individual preferences in risk management. The following subsections discuss traditional risk analysis, availability cascades, and the cultural evaluator model in more detail.

A. *Traditional Risk Analysis*

The most influential approach to risk management has been, and remains, traditional risk analysis. The broad influence of this expert-centered, data-driven methodology is one reason why the role of public opinion in formal risk management has been marginalized. Traditional risk analysis (also referred to as “risk management”) can be defined as “the identification, assessment, and prioritization followed by coordinated and economical application of resources to minimize, monitor, and control the probability and/or impact of

²⁹ Kuran & Sunstein, *supra* note 23, at 703.

³⁰ *Id.* at 683.

unfortunate events.”³¹ Traditional risk analysis has been conceived of as a method for determining an appropriate response on a large-scale to widespread or catastrophic risk.³²

Traditional risk analysis has been used widely and applied to gauge risk in the areas of business enterprise, systems management, insurance, health epidemics, and military operations, to name a few. Depending upon the project or set of circumstances, the goals may vary somewhat, though the method tends to be consistent.³³ Within this methodology, attempts have been made to create international standards by which risk can be assessed and managed.³⁴

Traditional risk analysis has relied on a purportedly value-neutral formula: [probability of risk occurring] x [cost associated with that risk event].³⁵ The formula-based approach focuses largely on hazards related to new technologies, environmental degradation, and public health.³⁶ It was, and still is, “distinctly ‘expert-centered’ and uncomfortable with (or even hostile to) considering the views of

³¹ DOUGLAS W. HUBBARD, *THE FAILURE OF RISK MANAGEMENT: WHY IT’S BROKEN AND HOW TO FIX IT* 10 (2009).

³² See, e.g., RICHARD A. POSNER, *CATASTROPHE: RISK AND RESPONSE* 14 (2004) (advocating the use of cost-benefit analysis by regulators when shaping responses to catastrophic risk).

³³ The methodology involves the following steps: (1) identify, characterize, and assess threats; (2) assess the vulnerability of critical assets; (3) determine the consequences (i.e., the risk); (4) identify ways to reduce those risks; and (5) prioritize risk reduction measures based on a strategy. INT’L ORG. FOR STANDARDIZATION, COMMITTEE DRAFT OF ISO 31000 RISK MANAGEMENT—GUIDELINES ON PRINCIPLES AND IMPLEMENTATION OF RISK MANAGEMENT (2007).

³⁴ For example, the International Organization for Standardization has codified a family of standards relating to risk called ISO 31000. INT’L ORG. FOR STANDARDIZATION, *ISO 31000:2009 RISK MANAGEMENT—PRINCIPLES AND GUIDELINES* (2009). The purpose of ISO 31000:2009 is to provide principles and generic guidelines on risk management. See *id.*

³⁵ Kasperson et al., *supra* note 1, at 177. The formula parallels one side of the well-known Coase Theorem, expressed as $B < PL$, and famously cited by Judge Learned Hand of the Second Circuit Court of Appeals in his decision, *United States v. Carroll Towing Co.*, 159 F.2d 169 (2d Cir. 1947). The Coase Theorem represents an efficiency equation in which B is the burden of prevention, P is the probability of loss, and L is the cost of the loss. Optimal efficiency is reached when prevention is taken only if the cost of prevention is less than PL . Importantly, this formula works when the losses are pecuniary. Important ethical considerations arise when the losses involve human life or health.

³⁶ See Gary E. Machlis & Eugene A. Rosa, *Desired Risk: Broadening the Social Amplification of Risk Framework*, 10 RISK ANALYSIS 161, 161 (1989) (arguing that one important—but oft neglected—aspect of risk behavior is that of risks that people freely assume).

diverse, nonexpert parties.”³⁷ Risks are defined as the chance of physical harm (to person, property, or element of the natural world) due to technologies, diseases, or other mechanisms.³⁸ This definition excludes explicit consideration of affect- or value-based reactions to risk.

Traditional risk analysis is not without its critics. Some of the criticism has focused on the method’s overreliance on basic methods and formulas that lack predictive power.³⁹ However, there is a more fundamental issue relating to the inputs: traditional risk analysis gives little or no consideration to the human element; the analysis either ignores or substantially underemphasizes public sentiment regarding potential threats.⁴⁰ This feature of risk analysis means that policy makers are (1) unable to predict how members of society will view specific dangers as the threats become salient to the public and (2) ill-equipped to craft responses to risk that take into account public fear of these hazards.⁴¹ In other words, as Kasperson, Renn, and Slovic have noted, “the technical concept of risk is too narrow and ambiguous to serve as the crucial yardstick for policy making.”⁴² Beck similarly worries that as long as the debate is “conducted exclusively or dominantly in the terms and formulas of *natural* science” the danger

³⁷ Paul Slovic, *Trust, Emotion, Sex, Politics, and Science: Surveying the Risk Assessment Battlefield*, 1997 U. CHI. LEGAL F. 59, 98 (1997).

³⁸ Scott Lash & Brian Wynne, *Introduction* to BECK, *supra* note 9, at 4.

³⁹ See, e.g., HUBBARD, *supra* note 31, at 46.

⁴⁰ See Kasperson et al., *supra* note 1, at 177.

⁴¹ Proposed characteristics of effective risk management have attempted to account for the human element, but only in a reactive, rather than a responsive and interactive, fashion. The proposed characteristics are as follows:

- (1) Risk management should create value;
 - (2) Risk management should be an integral part of organizational processes;
 - (3) Risk management should be part of decision making;
 - (4) Risk management should explicitly address uncertainty;
 - (5) Risk management should be systematic and structured;
 - (6) Risk management should be based on the best available information;
 - (7) Risk management should be tailored;
 - (8) Risk management should take into account human factors;
 - (9) Risk management should be transparent and inclusive;
 - (10) Risk management should be dynamic, iterative, and responsive to change;
- and
- (11) Risk management should be capable of continual improvement and enhancement.

INT’L ORG. FOR STANDARDIZATION, *supra* note 34, at 2.

⁴² Kasperson et al., *supra* note 1, at 178.

exists that the “terms will inadvertently include human beings in the picture only as *organic material*” and that “it runs the risk of atrophying into a discussion of nature *without* people, without asking about matters of social and cultural significance.”⁴³

Another layer of complexity in this discussion stems from the fact that harms often accompany technologies, processes, or products that have important benefits. The value placed on these benefits can fluctuate so that even if the evaluation of associated benefits and harms stays constant, tolerance for the risk may change. Particularly, as novel technologies develop making other technologies obsolete, this balance of benefit and harm is ever evolving. This aspect of modern risk analysis is another reason why some have argued that it is not appropriate for risk experts, who might not have a clear sense of the current value of a particular technology to the public at large, to be the exclusive determiners of the relative risk of various technologies.⁴⁴

B. Psychometric Study of Risk Perception

The psychometric study of risk was a response to traditional risk analysis. Risk-benefit is a method of analysis that asks, “Is this product (activity, technology) acceptably safe? Alternatively, how safe is safe enough?”⁴⁵ Baruch Fischhoff along with Paul Slovic and colleagues believed that the risk-benefit analysis was inadequate for answering those questions.⁴⁶ Fischhoff and Slovic were particularly critical of one proposed justification for risk-benefit analysis, called “revealed preferences.” Revealed preferences is based upon the assumption that through trial and error society has determined an optimum level of risk for a given activity.⁴⁷ Hence, the existing risk-benefit balance is appropriate, and there is no need to take a separate, empirical measure of individuals’ risk preferences. The primary criticism of revealed preferences is that it ignores the fact that

⁴³ BECK, *supra* note 9, at 24. Although some cost-benefit risk analysts who have traditionally focused on economic issues have started to raise relevant questions about risk perception and preferences, they have done little to *answer* these questions. See Ian Savage, *An Empirical Investigation into the Effect of Psychological Perceptions on the Willingness-to-Pay to Reduce Risk*, 6 J. RISK & UNCERTAINTY 75, 76 (1993).

⁴⁴ For a discussion of the cultural evaluator theory of risk perception, see *infra* Part I.E.

⁴⁵ See Fischhoff et al., *supra* note 28.

⁴⁶ The work with which Fischhoff, Slovic, and colleagues took issue is Chauncey Starr’s *Social Benefit Versus Technological Risk*, 165 SCIENCE 1232 (1969).

⁴⁷ *Id.* at 1232.

society's preferences fluctuate.⁴⁸ Revealed preferences also assumes that the market correctly reflects the optimal risk level and discounts the possibility that the public is accepting a risk because the public is ignorant of the potential for harm or the potential for elimination of harm.⁴⁹

Fischhoff and colleagues proposed a surprisingly little-used method of ascertaining the “acceptability” of risk—they asked people questions.⁵⁰ The goal was to derive a “cognitive map,”⁵¹ or a taxonomy, for hazards that could serve as a tool for understanding and predicting risk responses.⁵² Psychometric researchers hoped to explain “people’s extreme aversion to some hazards, their indifference to others, and the discrepancies between these reactions and opinions of experts.”⁵³ The initial method and the results were presented in Fischhoff’s 1978 empirical paper. Although the methodology was not without drawbacks,⁵⁴ the work represented a breakthrough in risk analysis, turning focus toward the perceptions and priorities of members of the public rather than focusing exclusively on formulas or experts to determine acceptable risks and risk levels.

C. *The Social Amplification of Risk Theory*

If the psychometric study of risk perception was a breakthrough, the SAR theory advanced the field further, building on the previous work by adding social, cultural, and other dynamic aspects of risk perception to the equation.⁵⁵ In 1988, Roger Kasperson and his colleagues introduced the SAR framework, which sought to describe active and interactive forces through which risk perceptions are amplified and attenuated.⁵⁶ SAR included additional influences not

⁴⁸ See Fischhoff et al., *supra* note 28, at 129.

⁴⁹ See *id.* at 128.

⁵⁰ See *id.* at 127.

⁵¹ See Paul Slovic, *Perception of Risk*, in *THE PERCEPTION OF RISK*, *supra* note 4, at 222.

⁵² See Slovic, *supra* note 8.

⁵³ Paul Slovic & Elke U. Weber, *Perception of Risk Posed by Extreme Events* 7 (paper presented at “Risk Management Strategies in an Uncertain World,” Palisades, N.Y., Apr. 12–13, 2002).

⁵⁴ For example, the respondents were all women and were all members of the League of Women voters. For a variety of reasons, this group is not likely to be representative of society as a whole.

⁵⁵ See generally Kasperson et al., *supra* note 1.

⁵⁶ See *id.*

accounted for by traditional risk analysis. Like the psychometric model, SAR accounts for characteristics of a hazard that influence the public's response to risk, including whether the public assumed the risk voluntarily, the public's familiarity with the source of the danger, and the potential for catastrophe.⁵⁷ In addition, SAR includes consideration of cultural factors, such as those affecting the priorities and agendas of various societal subgroups, the associated efforts to influence risk responses, and social aspects, including the impacts of information communication.⁵⁸ Hence, SAR is concerned with more than cost-benefit analysis or individual preference; this theory includes factors that implicate ethical and normative considerations.

The SAR concept envisions a flexible feedback system in which social perceptions of risks influence behaviors, which then impact responses to risk, which in turn influence the public's view of the risk.⁵⁹ In addition to the more comprehensive framework provided by SAR, the theory makes several particularly valuable contributions to the field of risk analysis. In short, SAR posits that "risk events interact with psychological, social, and cultural processes in ways that can heighten or attenuate public perceptions of risk and related risk behavior . . . [and that] behavioral patterns in turn generate secondary social or economic consequences . . . [and] may act also to increase or decrease the physical risk itself."⁶⁰

1. Amplification Mechanisms

SAR identifies "amplification stations" and steps whereby, either through direct experience or by learning from other sources, individuals develop heightened sensitivity to various risks.⁶¹ Kasperson and colleagues describe this process at the message and signal levels. At the message level, SAR proposes that individuals automatically parse the communication into factual information,

⁵⁷ See *id.*; Machlis & Rosa, *supra* note 36, at 164.

⁵⁸ See Arie Rip, *Should Social Amplification of Risk Be Counteracted?*, 8 RISK ANALYSIS 193, 196 (1988). See generally Kasperson et al., *supra* note 1.

⁵⁹ Kasperson et al., *supra* note 1, at 178 (admitting that other scholars have written in a less comprehensive fashion about the dynamic social aspect of risk analysis); see Brian Wynne, *Public Perceptions of Risk*, in *THE URBAN TRANSPORTATION OF IRRADIATED FUEL* 246 (John Surrey ed., 1984). See generally *THE SOCIAL AND CULTURAL CONSTRUCTION OF RISK* (Branden B. Johnson & Vincent T. Covello eds., 1987).

⁶⁰ See Kasperson et al., *supra* note 1, at 178; see also Nick Pidgeon, *Risk Communication and the Social Amplification of Risk: Theory, Evidence and Policy Implications*, 4 RISK DECISION & POL'Y 145, 146 (1999).

⁶¹ See Kasperson et al., *supra* note 1, at 184; see also Pidgeon, *supra* note 60, at 147.

inferential messages, and conclusions, the formation of which depends upon which cultural symbols and values are implicated.⁶² In addition to the content of the message, the number of times the message is repeated may affect judgments about accuracy.⁶³ At the signal level, scientists, the media, political organizers, public agencies, and other interested individuals and groups generate and communicate information about the potential for harm.⁶⁴ Recipients of the information filter and decode the signals that they receive and ultimately interpret and often communicate that information to others, forming conclusions in the process.⁶⁵

2. *Second- and Third-Order Impacts*

Once recipients have interpreted the information, bringing personal experience and value judgments to bear in the process, the recipients manifest behavioral responses. These responses can involve attempts to change the status quo, including pressuring policy makers, altering personal behavioral patterns, communicating attitudes to others in the community, and engaging in related consumer behavior.⁶⁶ These behavioral responses result in secondary impacts, which, according to Kasperson and colleagues, include impacts on business sales, modifications in training of emergency personnel, protesting or other forms of social unrest, changes in regulatory standards, and political and social pressure.⁶⁷

3. *Information Channels*

In addition to describing outcomes, social amplification theory also seeks to explain the characteristics of information flow and how patterns of social exchange and the very nature of communication can impact perceptions of risk. SAR identifies four aspects of communication about risk that can affect risk judgments: the volume of information about the risk, the degree to which the information is controversial, the sensationalistic nature of the information, and the

⁶² Kasperson et al., *supra* note 1, at 180.

⁶³ *Id.*; *see also* Kasperson & Kasperson, *supra* note 18, at 96; Pidgeon, *supra* note 60, at 147.

⁶⁴ Kasperson et al., *supra* note 1, at 181.

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ *Id.* at 182; *see also* Pidgeon, *supra* note 60, at 147 (explaining that some events will lead to spreading “ripples” of secondary consequences that go beyond the initial impact of the event); Machlis & Rosa, *supra* note 36, at 163.

“symbolic connotations” inherent in the information.⁶⁸ Several of these characteristics implicate certain previously discussed so-called amplification stations. For example, the media’s interest in a particular risk is likely to result in repeated, highly sensationalized reports that increase the public’s attention to the risk.⁶⁹

Social amplification theory is primarily focused on risk amplification, but the theory does provide some insight into factors that will tend to result in risk attenuation.⁷⁰ One example is an individual’s direct, personal experience with a particular risk. Although direct experience can serve to amplify risk judgments, such as when a hazard leaves an indelible memory because of its vivid nature, amplification is not the only possible result of direct experience.⁷¹ Familiarity with a risky activity can sometimes result in statistically low-risk calculations, as is the case when drivers are asked the likelihood of serious injury or death resulting from the operation of an automobile.⁷²

4. Features of the Social Environment

Recipients of information about risks have characteristics that help to determine how they will receive and process the information. For example, human beings are limited in their ability to analyze and store information. As a result, humans rely on cognitive rules of thumb, or heuristics, when they process information.⁷³ Although the use of heuristics is often helpful, it can also result in misleading or biased judgments.⁷⁴ Cultural values, like heuristics, shape the lens through

⁶⁸ See Kasperson et al., *supra* note 1, at 184.

⁶⁹ *Id.* (pointing out that repeated coverage of a particular hazard can result in public “scares”).

⁷⁰ See William J. Burns et al., *Incorporating Structural Models into Research on the Social Amplification of Risk: Implications for Theory Construction and Decision Making*, 13 RISK ANALYSIS 611 (1993) (developing structural models to explain how the impact upon society of an accident is influenced by several factors, including the physical consequences of the event, perceived risk, media coverage, and public response).

⁷¹ See Kasperson & Kasperson, *supra* note 18, at 96.

⁷² Kasperson et al., *supra* note 1, at 184 (“Generally, experience with dramatic accidents or risk events increases the memorability and imaginability of the hazard, thereby heightening the perception of risk. But direct experience can also . . . afford[] better perspective and enhanced capacity for avoiding risks.”).

⁷³ Heuristics and biases are discussed in greater detail *infra* Part II.

⁷⁴ See Kasperson et al., *supra* note 1, at 185 (citing JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES (Daniel Kahneman et al. eds., 1982)).

which information is evaluated and assimilated, helping to determine which dangers are given high priority.⁷⁵

Timing becomes important when the political landscape encourages posturing around real or perceived dangers to public welfare. When subgroups within society hold opposing views on issues, SAR theory predicts that a risk “will be vigorously brought to more general public attention . . . [and p]olarization of views and escalation of rhetoric by partisans typically occur and new recruits are drawn into the conflicts.”⁷⁶ Kasperson and colleagues also claim that the “signal” sent by a risk event and the “stigma” associated with certain locations or processes can influence risk perception.⁷⁷

This type of polarization and galvanization around an issue or event is a typical phenomenon in politics, particularly in our two-party system. Discontent over the state of the economy, financial markets, the housing market, and unemployment generally caused deep divisions following a series of events occurring between 2007 and 2010. The precipitous fall of the housing market, starting in 2006,⁷⁸ proved disastrous for countless Americans, many of whom lost their jobs and ultimately their homes in the ensuing financial meltdown.⁷⁹ According to the social amplification of risk theory, the economic downturn served as a signal, shaping how Americans viewed subsequent events. Subsequent events, such as the government bailout of struggling financial institutions, the implementation of the Troubled Asset Relief Program⁸⁰ (signed into law by President George W. Bush on October 3, 2008), the election of

⁷⁵ See *id.* An example of just such a value is the notion that society’s children are worthy of special protection because they are uniquely vulnerable members of society and because they are the “future” or our civilization. This sentiment would result in a higher level of concern over risks that could negatively impact young members of society.

⁷⁶ See *id.*

⁷⁷ The inclusion of “signal value” and “stigmatization,” while helpful and relevant to predicting and understanding public reactions to risk, do not fit particularly well under the rubric of social environmental factors. Ambiguity in how to categorize various SAR factors is one drawback of the theory.

⁷⁸ According to one report, “A variety of experts now say, the housing industry appears to be moving from a boom to something that is starting to look a lot like a bust.” Jeremy W. Peters, *Sales Slow for Homes New and Old*, N.Y. TIMES, July 26, 2006, http://www.nytimes.com/2006/07/26/business/26home.html?_r=1&oref=login&ref=business&pagewanted=print.

⁷⁹ See Press Release, Cambridge Energy Research Assocs., *Three Top Economists Agree 2009 Worst Financial Crisis Since Great Depression* (Feb. 29, 2009), available at <http://www2.cera.com/news/details/1,2318,10119,00.html>.

⁸⁰ For more on the Troubled Asset Relief Program, see <http://www.federalreserve.gov/bankinfo/tarinfo.htm> (last visited Sept. 30, 2011).

Barack Obama to the presidency one month later, and Obama's subsequent push for health care reform were evaluated in terms of the ongoing crisis, fueling the anxiety of those already apprehensive about threats to their financial security. With fear as a powerful catalyst, citizens became increasingly nervous and divided.

As noted by the Pew Research Center in April 2010, "By almost every conceivable measure Americans are less positive and more critical of government these days."⁸¹ The Pew survey concluded that "a perfect storm of conditions associated with distrust of government—a dismal economy, an unhappy public, [and] bitter partisan-based backlash [resulted in] epic discontent with Congress and elected officials."⁸² SAR does a fairly good job of explaining the economic downturn, the subsequent reactions of American citizens, and the ensuing economic and political events. The explanatory power of this theory makes it valuable.

D. Availability Cascade Theory

What explains widespread fixations on unthreatening waste dumps, nearly harmless chemicals, and unlikely causes of a tragic airplane crash, when for years on end far more serious health hazards, such as breast cancer, indoor air pollution, "junk food" consumption, and asthma in the inner city have commanded comparatively little attention?⁸³

This is the question Timur Kuran and Cass Sunstein posed more than a decade after Kasperson and colleagues published their initial paper on social amplification of risk. The answer, according to Kuran and Sunstein, is availability cascades.⁸⁴ Kuran and Sunstein based their notion of availability cascades on the work of Kahneman and Tversky, who described the availability heuristic twenty-five years

⁸¹ News Release, Pew Research Ctr. for the People and the Press, *The People and Their Government: Distrust, Discontent, Anger and Partisan Rancor* (Apr. 18, 2010), available at <http://people-press.org/reports/pdf/606.pdf>.

⁸² *Id.*

⁸³ See Kuran & Sunstein, *supra* note 23, at 703.

⁸⁴ Although the first published paper containing an extensive discussion of availability cascades was Timur Kuran and Cass R. Sunstein's *Availability Cascades and Risk Regulation*, *supra* note 23, several other law review articles referred to the concept in 1998, citing to the Kuran and Sunstein paper as a work in progress, see, e.g., Christine Jolls et al., *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471 (1998); Cass R. Sunstein, *How Law Constructs Preferences*, 86 GEO. L.J. 2637 (1998); Cass R. Sunstein, *Behavioral Analysis of Law*, 64 U. CHI. L. REV. 1175 (1997).

earlier.⁸⁵ Kahneman and Tversky described the availability heuristic as operating in “situations in which people assess the frequency of a class or the probability of an event by the ease with which instances or occurrences can be brought to mind. . . . This judgmental heuristic is called availability.”⁸⁶ The availability heuristic has gained traction in legal scholarship, which has defined it as a widely used mental shortcut that leads people to assign a higher likelihood to events that are readily “available,” which is to say those that are particularly likely to come to mind due to their vividness, recency, or frequency.⁸⁷

The primary claim of Kuran and Sunstein is that in certain instances, the availability heuristic is perpetuated and enlarged by certain social mechanisms that serve to reinforce widespread, erroneous risk judgments.⁸⁸ Availability cascades occur when information about potential harms travels through social communication channels, creating and reinforcing a prevailing wisdom.⁸⁹ The process occurs when “expressed perceptions trigger chains of individual responses that make these perceptions appear

⁸⁵ See Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, 185 *SCIENCE* 1124, 1127 (1974) [hereinafter Tversky & Kahneman, *Judgment*] (introducing “availability” along with other heuristics and biases); see also Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, in *JUDGMENT*, *supra* note 74, at 11 [hereinafter Tversky & Kahneman, *Uncertainty*]. For some early law review pieces discussing heuristic processing and responses in legal frameworks, see Alan Schwartz & Louis L. Wilde, *Imperfect Information in Markets for Contract Terms: The Examples of Warranties and Security Interests*, 69 *VA. L. REV.* 1387, 1436–42 (1983) (discussing the availability and representative heuristics); Barbara D. Underwood, *Law and the Crystal Ball: Predicting Behavior with Statistical Inference and Individualized Judgment*, 88 *YALE L.J.* 1408, 1428 (1979) (“The studies show that in making individualized judgments people rely primarily on information about the case at hand, paying relatively little attention to background information about other cases.”).

⁸⁶ See Tversky & Kahneman, *Judgment*, *supra* note 85, at 1127.

⁸⁷ The characteristics (frequency, recency, and vividness) that increase cognitive availability (or make specific examples more memorable) have important implications for determining when risk communication is likely. The availability heuristic therefore becomes central in formulating a predictive model of risk communication and perception. See Kuran & Sunstein, *supra* note 23, at 685–91; see also Christine Jolls, *On Law Enforcement with Boundedly Rational Actors*, in *THE LAW AND ECONOMICS OF IRRATIONAL BEHAVIOR* 268, 270–71 (Francesco Parisi & Vernon L. Smith eds., 2005); Jolls et al., *supra* note 84, at 1519; Russell B. Korobkin & Thomas S. Ulen, *Law and Behavioral Science: Removing the Rationality Assumption from Law and Economics*, 88 *CALIF. L. REV.* 1051, 1091 (2000); Justin Pidot, Note, *The Applicability of Nuisance Law to Invasive Plants: Can Common Law Liability Inspire Government Action?*, 24 *VA. ENVTL. L.J.* 183, 222–23 (2005); Cass R. Sunstein, *Precautions Against What? The Availability Heuristic and Cross-Cultural Risk Perception*, 57 *ALA. L. REV.* 75, 77 (2005).

⁸⁸ See Kuran & Sunstein, *supra* note 23, at 685.

⁸⁹ See Sunstein, *supra* note 87, at 77.

increasingly plausible through their rising availability in public discourse.”⁹⁰ The motivations behind these cascades may be reputational or informational.⁹¹

A reputational cascade occurs when individuals espouse views because doing so carries with it some sort of social advantage.⁹² In the case of a reputational cascade, the prevailing wisdom is accepted and perpetuated independent of, and sometimes in spite of, a society member’s actual worldview.⁹³ An informational cascade, in contrast, is based upon the genuine acceptance that beliefs that are espoused by a significant segment of society must be correct.⁹⁴ The informational cascade is, therefore, driven by individuals’ searches for data about their worlds.⁹⁵

In their search for truth and their efforts to maintain a positive reputation, individuals perpetuate beliefs that come to them through various communication channels by adopting those beliefs and

⁹⁰ Kuran & Sunstein, *supra* note 23, at 685; *see also* Molly J. Walker Wilson & Megan P. Fuchs, *Publicity, Pressure, and Environmental Legislation: The Untold Story of Availability Campaigns*, 30 CARDOZO L. REV. 2147, 2157 (2009) (discussing the “trigger phase” in their model of the availability campaign).

⁹¹ Kuran & Sunstein, *supra* note 23, at 686. The concept of informational and reputational motivations is related to the similar concepts of injunctive norms (norms of which most others *approve* or *disapprove*) and descriptive norms (that which most others *do*). Kuran and Sunstein point out that there may be overlap between these two types of cascades and that this overlap occurs when individuals affected by these cascades have dual underlying motivations: obtaining information *and* gaining social approval. *Id.* at 687. *See generally* Robert B. Cialdini et al., *A Focus Theory of Normative Conduct: Recycling the Concept of Norms to Reduce Littering in Public Places*, 58 J. PERSONALITY & SOC. PSYCHOL. 1015, 1023 (1990).

⁹² *See* Timur Kuran, *Ethnic Norms and Their Transformation Through Reputational Cascades*, 27 J. LEGAL STUD. 623, 623 (1998) (“[A] reputational cascade [is] a self-reinforcing process by which people motivated to protect and enhance their reputations induce each other to step up their ethnic activities.”).

⁹³ *Id.*

⁹⁴ *See* Kuran & Sunstein, *supra* note 23, at 686; Sushil Bikhchandani et al., *A Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascades*, 100 J. POL. ECON. 992 (1992) (discussing the utilitarian nature of informational cascades); *see also* Sushil Bikhchandani et al., *Learning from the Behavior of Others: Conformity, Fads, and Informational Cascades*, 12 J. ECON. PERSP. 151 (1998) [hereinafter Bikhchandani et al., *Learning*].

⁹⁵ For a discussion of how informational cascades can exacerbate risk aversion in a medical setting, *see* James Gibson, *Doctrinal Feedback and (Un)reasonable Care*, 94 VA. L. REV. 1641, 1670 (2008) (“[M]edicine is subject to informational cascades: the more physicians that adopt a new procedure, the greater the chance that other physicians will discount any individual misgivings and follow the herd.”). *See generally* Bikhchandani et al., *Learning*, *supra* note 94 (discussing herd behavior generally).

communicating them to other members of society.⁹⁶ Reputational and truth-seeking goals tend to reinforce and expand availability cascades. This process might not be problematic, according to Kuran and Sunstein, if it were not for the fact that the information about risk that travels like “wildfire”⁹⁷ through social discourse is often incorrect or misleading.⁹⁸ Socially communicated risk information contains inflated estimates of risk and causes “public panics.”⁹⁹ Kuran and Sunstein are careful to qualify their claim; they stop short of characterizing as maladaptive human tendencies to seek information through social channels. They acknowledge that social networks are valuable sources for information about potential harms.¹⁰⁰ According to Kuran and Sunstein, the inefficiency occurs, not because people look to others for information to form the basis for beliefs, but because communication cascades can help to create and reinforce availability effects, which in turn, can lead to widespread misperceptions.¹⁰¹

Although the primary article was coauthored by Kuran and Sunstein, Sunstein has written a series of articles and essays—several of which serve as the foundation for Sunstein’s book *Laws of Fear*—that elaborate on the initial availability campaign paper. Sunstein’s goal in this body of work is primarily normative. He argues that an effective government should be deliberative rather than simply

⁹⁶ See Sunstein, *supra* note 87, at 96; see also Recent Cases, Wang v. Attorney General, 423 F.3d 260 (3d. Cir. 2005), and Benslimane v. Gonzales, 430 F.3d 828 (7th Cir. 2005), 119 HARV. L. REV. 2596, 2601 (2006) (explaining that “politicians and the media repeat salient the examples in a self-reinforcing ‘availability cascade’”).

⁹⁷ This notion that information about fear travels like wildfire through society is the subject of a chapter in Sunstein’s book, *Laws of Fear* entitled “Fear as Wildfire.” See CASS R. SUNSTEIN, LAWS OF FEAR 89–108 (2005).

⁹⁸ See *id.*

⁹⁹ See *id.*

¹⁰⁰ See Kuran & Sunstein, *supra* note 23, at 689 (“There is nothing irrational about participating in an informational cascade. Often people have little information about the magnitude of a risk or the seriousness of an alleged social problem. They stand to gain from tuning into, and letting themselves be guided by, the signals of others.”).

¹⁰¹ See Tversky & Kahneman, *Uncertainty*, *supra* note 85, at 11–14 (describing how the availability heuristic can lead to errors in reasoning and decision making); see also Kuran & Sunstein, *supra* note 23, at 688 (acknowledging that availability campaigns can spark useful debate on neglected issues, but maintaining that “availability campaigns sometimes do great harm by producing widespread availability errors”); *id.* at 685 (“Under certain circumstances . . . [availability cascades] generate persistent social *availability errors*—widespread mistaken beliefs grounded in interactions between the availability heuristic and the social mechanisms we describe. The resulting mass delusions may last indefinitely, and they may produce wasteful or even detrimental laws and policies.” (internal footnote omitted)).

reactive. He makes the case that public panics can influence policy, resulting in inefficient and potentially harmful legislation.¹⁰² Sunstein also takes issue with the precautionary principle, namely the notion that when a potential risk is identified, steps should be taken to guard against the risk, even when scientific consensus is lacking. A primary claim of Sunstein's body of work on risk response is that the tendency to take precautions against publicly perceived threats often imposes more costs than taking no action at all. According to Sunstein, availability cascades result in widespread—often misplaced—alarm, and can result in action that leads to a net loss to society.

E. The Cultural Evaluator Model and the Role of Emotion

The rationale for omitting the public from risk policy decisions—as seen in the work of Kuran and Sunstein as well as in traditional risk management—is the notion that members of the public are irrationally influenced by their emotional reactions.¹⁰³ The cultural view of risk perception questions this assumption. Recent scholars interested in cultural antecedents of risk response question the notion that “facts” ascertained by experts should serve as the exclusive basis for sound risk policy.¹⁰⁴ Instead, scholars argue that “facts cannot be

¹⁰² Cass R. Sunstein, *Cognition and Cost-Benefit Analysis*, 29 J. LEGAL STUD. 1059, 1067 (2000) (noting that cascade effects caused by the availability heuristic can produce a public demand for regulation even though the relevant risks are trivial, while producing little or no demand for regulation of risks that are large in magnitude); *see also* Sunstein, *supra* note 87, at 98 (noting that cascade effects caused by the availability heuristic can produce a public demand for regulation regardless of the actual risk).

¹⁰³ Paul Slovic, *The Risk Game*, 86 J. HAZARDOUS MATERIALS 17, 18 (2001) (“[Public risk judgments] are seen as irrational by many harsh critics of public perceptions. These critics draw a sharp dichotomy between the experts and the public. Experts are seen as purveying risk assessments, characterized as objective, analytic, wise, and rational—based on the *real risks*. In contrast, the public is seen to rely upon *perceptions of risk* that are subjective, often hypothetical, emotional, foolish, and irrational.”); *see also* Kuran & Sunstein, *supra* note 23, at 683 (supporting the notion that emotions can cause irrational decision making in the dual system concept of reasoning). System 1 reasoning is “fast, automatic, effortless, associative, and often emotionally charged.” Daniel Kahneman, *Maps of Bounded Rationality: Psychology for Behavioral Economics*, 93 AM. ECON. REV. 1449, 1451 (2003). On the other hand, System 2 reasoning is slow and deliberate, and more likely to include consideration of probabilities and careful weighing of costs and benefits. *Id.* The implication of this view is that System 1 is necessary in situations that lack information and resources and is more likely to result in error than System 2. *See* Kahan, *supra* note 26; Kasperson et al., *supra* note 1, at 181; *see also* BECK, *supra* note 9, at 24; Fischhoff et al., *supra* note 28.

¹⁰⁴ *See* Kasperson & Kasperson, *supra* note 18 (“Assessment procedures derived from the public health, toxicity, and engineering studies that have dominated the management

separated from values in policy-related science contexts.”¹⁰⁵ Put differently, risk judgments are socially constructed and do not exist as independent “truths” to be discovered.¹⁰⁶ For the proponent of a cultural model, affective (emotional) responses to risk are expressions of socially and culturally derived values.¹⁰⁷ As such, these affective responses gain legitimacy in the risk policy discussion. Legal scholar Dan Kahan writes, “When people draw on their emotions to judge the risk that such an activity poses, they form an expressively rational attitude about what it would *mean* for their cultural worldviews for society to credit the claim that that activity is dangerous and worthy of regulation”¹⁰⁸

Cultural theory is sometimes discussed with reference to cultural “biases,” or patterns of social relationships and cultural understandings that result in particular worldviews.¹⁰⁹ A central feature of the theory is the notion that culturally derived values have legitimate influences over risk preferences.¹¹⁰ The membership of an individual in a certain class—hierarchical, egalitarian, individualistic, and fatalistic—may help gauge that individual’s risk tolerance and preferences.¹¹¹ Importantly, because all human beings are cultural evaluators, no one individual can act as an unbiased “expert” free from cultural influences on risk evaluations. Hence, to allow certain individuals to serve as “experts” with unique power to formulate risk responses is to privilege the cultural understandings of a few members of society at the expense of the cultural understandings of the rest of

programs of governments and corporations illuminate one portion of the risk complex while concealing others.”); *see also* Slovic, *supra* note 8, at 285 (arguing for the importance of the public’s role in risk assessment).

¹⁰⁵ Judith A. Bradbury, *The Policy Implications of Differing Concepts of Risk*, 14 SCL., TECH. & HUM. VALUES 380, 381 (1989).

¹⁰⁶ *See id.* at 381.

¹⁰⁷ *See generally* Kahan, *supra* note 26.

¹⁰⁸ *Id.* at 750–51.

¹⁰⁹ The term “bias” is a bit of a misnomer, given that bias tends to have consistently negative connotations. “Cultural tendencies” is probably more reflective of the nature of these underlying predilections.

¹¹⁰ Marris et al., *supra* note 5, at 636.

¹¹¹ Thompson and colleagues have discussed the variables as follows: “*Group* refers to the extent to which an individual is incorporated into bounded units. The greater the incorporation, the more individual choice is subject to group determination. *Grid* denotes the degree to which an individual’s life is circumscribed by externally imposed prescriptions.” MICHAEL THOMPSON ET AL., *CULTURAL THEORY* 5 (1990).

society.¹¹² Anthropologist Mary Douglas has argued that purportedly value-neutral scientists and policy analysts commonly foist their own values on the public. Douglas claimed that the risk researcher's "method assumes that all humans have the same responses and preferences that are enshrined in the utilitarian philosophy. Instead of objectivity, we find ideological entrenchment."¹¹³ The often wholesale substitution of experts' opinions for those of the public is particularly problematic when considering data from studies suggesting that the public and experts hold divergent views about risks.¹¹⁴ Another critical aspect of the cultural evaluator model is the belief that individuals may have deeply personal reasons for choosing certain risks over others.¹¹⁵ Accordingly, a uniform approach to any particular source of risk should therefore be undertaken with the understanding that it may subvert the values of some members of society.

The availability cascade and cultural evaluator theories offer opposing normative claims in the area of risk policy and response. Sunstein and Kahan have particular prescriptive agendas for risk managers and lawmakers. Rather than debating the merits of each claim in order to declare a victor, the method this Article proposes extracts the elements underlying the predictive arguments. After distilling the data that serves as the basis for the normative arguments, this Article incorporates the relevant information into the model.

F. Why a Comprehensive Model Is Necessary

1. Limitations of Existing Theories

While each of the above methods of risk analysis lends something important to the discussion, none of the theories I have discussed provides a comprehensive framework to guide risk policy decisions. Moreover, the theories are distinct: they do not build on one another,

¹¹² See *id.*; see also SUNSTEIN, *supra* note 97, at 126 (providing examples of works that propose substituting public risk decisions with those of unbiased experts). See generally Kuran & Sunstein, *supra* note 23.

¹¹³ MARY DOUGLAS, *RISK AND BLAME: ESSAYS IN CULTURAL THEORY* 13 (1992) ("When he brackets off culture from his work, the well-intentioned risk analyst has tied his own hands. He wants to be free of bias, he would rather pretend that bias is not important than sully himself by trying to categorize kinds of bias."); accord MARY DOUGLAS & AARON WILDAVSKY, *supra* note 2 (1982).

¹¹⁴ See James Flynn & Paul Slovic, *Expert and Public Evaluations of Technological Risks: Searching for Common Ground*, 10 *RISK* 333, 356–57 (1999).

¹¹⁵ Kahan, *supra* note 26, at 741.

nor do they consistently learn from one another.¹¹⁶ Hence, each is necessarily incomplete. In addition, each of the theories and methods has specific drawbacks. This Article synthesizes the various theoretical perspectives to arrive at a complete model of public risk perception. The model represents a vital step toward a new understanding of how individuals assess and respond to potential threats. The model is designed to provide insight to risk managers and policy makers in the course of decision making. The model should also serve as a basis for further conversation and healthy debate about the role of the citizenry and experts in risk management.

Psychometric studies of risk perception are useful to the extent that they produce a detailed picture of those risks people report to be most worrisome. However, this method suffers from the fact that it asks questions about risk in a socially static context.¹¹⁷ Surveys about risk capture a snapshot of the risk judgments of a number of people without providing a good understanding of the degree to which those judgments are individual or a source of social understandings. At any given time, the risk perception of an individual might be influenced by information and evaluations of one or more other individuals. Psychometric studies of risk perception do not capture any of the social dynamic involved in risk perception.¹¹⁸ Moreover, asking respondents in a laboratory setting about their attitudes regarding various types of hazards sacrifices external validity; in other words, responses elicited in this fashion may not be genuine.¹¹⁹ An experimental setting is not necessarily representative of what occurs by the water cooler, on the neighborhood sidewalk, or at dinner parties. In those settings, there is a complex meeting of social, cultural, communication, and human elements.

Social amplification of risk attempts to correct the primary failing of psychometric studies by incorporating an understanding of the social dynamic involved in risk response. However, while SAR is an impressive attempt to derive a comprehensive model, the model accounts for only some of the empirically supported antecedents of

¹¹⁶ The exception is SAR, which takes into account psychometric risk analysis.

¹¹⁷ See Sjöberg, *supra* note 5, at 667.

¹¹⁸ There are other criticisms of this method as well. One is that the data derived is based upon self-reporting, which is a problematic method of gathering data because people are not always accurate or forthright about their own attitudes or behaviors.

¹¹⁹ See generally Bradbury, *supra* note 105, at 383–84 (suggesting that psychometric studies provide a subjectivist interpretation within an artificial paradigm that may provide unreliable results).

risk perception.¹²⁰ Moreover, although it is true that, as the SAR authors claim, “risk analysis . . . requires an approach that is capable of illuminating risk in its full complexity, is sensitive to the social settings in which risk occurs, and also recognizes that social interactions may either amplify or attenuate the signals to society about the risk,”¹²¹ the model is exceedingly complex. The SAR model is arguably too elaborate to be useable and testable.

Kuran and Sunstein’s work on the availability cascade is based upon the availability heuristic, a feature of human cognition that science has documented extensively. Although the theory is compelling, its foundation is a normative claim, and its “proof” is historical anecdote. Because it is backward-looking, the theory lacks predictive power. Moreover, Kuran and Sunstein’s normative claim is subject to criticism on several fronts.¹²² First, the claim assumes that risks possessing certain features are worthy of attention and resource expenditure, while others are not.¹²³ Second, the claim also recommends handing over the decision making to “experts,” an approach that scholars increasingly question.¹²⁴ As Beck has noted, “There is no expert on risk Where and how does one draw the line between still acceptable and no longer acceptable exposures?”¹²⁵ Third, unchecked deference to risk experts also undervalues the potential benefits stemming from social pressure for change.¹²⁶ Fourth, the claim assumes a unidirectional effect of social cascades. As Arie Rip points out, “[T]he focus as well as the concern is about intensification and the additional social costs accompanying ‘exaggerated’ responses . . . while there is no [equivalent discussion

¹²⁰ Pidgeon, *supra* note 60, at 148–49.

¹²¹ Kasperson & Kasperson, *supra* note 18, at 96; *see also* Wilson & Fuchs, *supra* note 90.

¹²² Kuran & Sunstein, *supra* note 23, at 685 (“Under certain circumstances . . . [availability cascades] generate persistent social *availability errors*—widespread mistaken beliefs grounded in interactions between the availability heuristic and the social mechanisms we describe. The resulting mass delusions may last indefinitely, and they may produce wasteful or even detrimental laws and policies.” (internal footnote omitted)).

¹²³ The claim alleges to possess a wisdom that trumps the prevailing wisdom of the time. *See* Molly J. Walker Wilson, *Adaptive Responses to Risk and the Irrationally Emotional Public*, 54 ST. LOUIS U. L.J. 1297 (2010). *See generally* DOUGLAS, *supra* note 113.

¹²⁴ *See* Sjöberg, *supra* note 5, at 666 (explaining that experts give considerably lower risk estimates than the public whenever they rate risks that fall within their own field of expertise and responsibility).

¹²⁵ BECK, *supra* note 9, at 29 (emphasis omitted).

¹²⁶ *See* Wilson & Fuchs, *supra* note 90.

or] example of the social costs of attenuation of risk.”¹²⁷ Fifth, the theory is of limited practical use in predicting public responses to potential sources of danger because the theory lacks a comprehensive mechanism for predicting specific factors and environments that contribute to public risk perception.¹²⁸

2. *What We Stand to Gain from a Comprehensive Model*

In addition to the limitations explained above, because each of the theoretical perspectives addresses a different focus, none of them provides a complete picture of how members of the public view different types of risks in the diverse social and cultural circumstances that can influence and shape perceptions. A model that draws on the best of each body of work gains a richness that any one approach standing alone lacks. This model also—because it is self-consciously focused on public perception—supplies lawmakers and experts what they have been lacking: the ability to include the individual, lay perspective in the decision-making equation.

Inclusion of the public in the decision-making process will result in a more discursive, thoughtful process of decision making in the face of some of the most serious threats.¹²⁹ Because their understanding of public risk perception is so limited, law and policy makers currently lack the ability to incorporate public attitudes prior to taking a course of action. Instead, they must wait for the public’s reaction after the fact, and then the feedback is often limited to situations in which the outcome is sufficiently disastrous to generate public outrage. The advantages of lawmakers’ having a model that could help determine risk preferences of members of the public in advance cannot be overstated.¹³⁰

¹²⁷ Rip, *supra* note 58, at 193. Rip questions the assumption that social amplification is necessarily problematic, as his title illustrates: *Should Social Amplification of Risk Be Counteracted?*

¹²⁸ In advancing his claims, Sunstein draws on the theories of Fischhoff, Slovic, Beck, and Kasperson, all of which are also discussed in this Article.

¹²⁹ See David A. Dana, *A Behavioral Economic Defense of the Precautionary Principle*, 97 NW. U. L. REV. 1315, 1328 (2003) (arguing that decision makers are more likely to carefully consider the consequences of various risks when the public is involved in the conversation).

¹³⁰ Dan M. Kahan et al., *Fear of Democracy: A Cultural Evaluation of Sunstein on Risk*, 119 HARV. L. REV. 1071, 1071 (2006) (“The public welfare of democratic societies depends on their capacity to abate all manner of natural and man-made hazards”); see also Fischhoff et al., *supra* note 28 (“Citizens of modern industrial societies are presently learning a harsh and discomfoting lesson—that the benefits from technology must be paid for not only with money, but with lives. . . . With increasing frequency, policy makers . . .

III

FOCI OF EXISTING RISK PARADIGMS

Scholars who have studied risk perception have generally focused on one of several methodologies. One line of research has applied broad findings from behavioral decision making to risk perceptions.¹³¹ Researchers have also attempted to derive a “cognitive map” of risk perception by identifying which characteristics of hazards are particularly likely to trigger fear or concern.¹³² Another focus of research emphasizes the social component of risk perception, examining the dynamic nature of risk communication as information travels through public discourse.¹³³ Yet another line of work focuses on the impact of cultural or sub-cultural factors on beliefs about risks.¹³⁴ Each theoretical approach has provided a different emphasis; each has yielded valuable insights, and yet, none is sufficient on its own. This Article discusses areas or issues emphasized by the different perspectives below. The following discussion sets the stage for subsequent consideration of the factors most likely to cause individuals concern.

A. Features of Human Decision Making and Cognition

Any discussion of decision making under conditions of uncertainty would be incomplete without the consideration of elements of human cognition first described by Herbert Simon, a psychologist, sociologist, and political scientist, who was interested in the question of how human beings make decisions. In 1955, Simon published a paper introducing the notion of “bounded rationality.”¹³⁵ The notion

have been turning to risk-benefit analysis . . . as the basic decision-making methodology for societal risk-taking.”); Paul Slovic et al., *Why Study Risk Perception?*, 2 RISK ANALYSIS 83, 83 (1982) (arguing that the question “‘How safe is safe enough?’ appears likely to be [a] major policy issue[]”).

¹³¹ See Fischhoff et al., *supra* note 28.

¹³² See Paul Slovic, *Perception of Risk*, in SLOVIC, *supra* note 4, at 224–26.

¹³³ See Kaspersen et al., *supra* note 1, at 177.

¹³⁴ These four topic areas represent the major themes in risk *perception*. Other themes surface in the context of risk *management*, such as the appropriate role of democratic participation and governance, and philosophical considerations about the value of a small number of lives versus conveniences benefiting society in general.

¹³⁵ Herbert Simon introduced the notion of “bounded rationality” in the 1950s to account for the fact that human beings have finite computational resources available for making choices. See generally 2 HERBERT A. SIMON, *MODELS OF BOUNDED RATIONALITY* (1982); Herbert A. Simon, *A Behavioral Model of Rational Choice*, 69 Q.J. ECON. 99 (1955) [hereinafter Simon, *Behavioral*].

that people are boundedly rational (or “satisficers”), refers to human beings’ limited capacity to collect, store, and retrieve information, as well as the tendency of individuals to fail to apply standard rules of logic when making decisions. Simon and other proponents of bounded rationality questioned rational choice theory (RCT), the neoclassical economic theory predicting that human beings effectively maximize their own expected utility through decision-making contexts.¹³⁶ RCT has not held up under close empirical scrutiny.¹³⁷ Social science research has revealed an extensive network of interrelated heuristics and biases that serve as the basis for much of human decision making.¹³⁸ In the simplest terms, empirical investigations have borne out Simon’s hypothesis, demonstrating that human beings have limited memories, an inability to gather all relevant information and correctly weigh factors, and the tendency to be influenced by biased or irrelevant information.¹³⁹

Behavioral decision theorists, who focus on identifying cognitive patterns and social factors that influence decision making, have been profoundly influenced by the work of Simon.¹⁴⁰ Eschewing rational

¹³⁶ See generally Thomas S. Ulen, *Rational Choice Theory in Law and Economics*, in THE ENCYCLOPEDIA OF LAW AND ECONOMICS 710 (Boudewijn Bouckaert & Gerrit De Geest eds., 1996).

¹³⁷ See Simon, *Behavioral*, *supra* note 135 (exemplifying an early discussion of behavioral decision making); see also BEHAVIORAL LAW AND ECONOMICS (Cass R. Sunstein ed., 2000); CHOICES, VALUES, AND FRAMES (Daniel Kahneman & Amos Tversky eds., 2000) (discussing empirical investigations of how human beings process information and make choices).

¹³⁸ Scholars discuss these heuristics and biases under the rubric of “behavioral decision theory” or “behavioral law and economics” and include anchoring and adjustment, optimism bias, representativeness heuristic, hindsight bias, conjunction fallacy, endowment effect and related status quo bias, risk aversion, and the availability heuristic, to name a few.

¹³⁹ Decision making using incomplete or imperfect information is an important feature of human functioning in the real world. Scholarship supporting this notion is abundant. The interdisciplinary field that explores cognitive features of human decision making combines law, psychology, and economic principles—as they relate to the “rational actor.” See, e.g., Jolls et al., *supra* note 84, at 1476 (“The task of behavioral law and economics, simply stated, is to explore the implications of *actual* (not hypothesized) human behavior for the law. How do ‘real people’ differ from *homo economicus*?”).

¹⁴⁰ See Daniel Kahneman & Amos Tversky, *Choices, Values, and Frames*, 39 AM. PSYCHOLOGIST 341, 347–48 (1984); Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision Under Risk*, 47 ECONOMETRICA 263 (1979); Daniel Kahneman & Amos Tversky, *Subjective Probability: A Judgment of Representativeness*, 3 COGNITIVE PSYCHOL. 430, 430 (1972). Some early law review pieces discuss heuristic processing and responses in legal frameworks. See Schwartz & Wilde, *supra* note 85, at 1436–42 (discussing the availability and representative heuristics); see also Underwood, *supra* note 85 (“[S]tudies show that in making individualized judgments people rely

choice theory in favor of Simon's bounded rationality, modern behavioral decision theorists have attempted to explain how human beings make decisions in light of empirically demonstrated realities of choice formation. Nowhere is this body of work more relevant than in the context of the type of decision making involved in evaluating risks. Like other decision tasks, seeking information, analyzing the information, and determining the appropriate approach involves searching, storage, and retrieval of information, perception, and reasoning.¹⁴¹ Hence, research and theory on decision making generally has clear relevance for risk perception and response. In fact, risk responses may be particularly vulnerable to nonrational judgment formation because this type of decision making often involves a high degree of uncertainty. Moreover, information about risks is particularly well suited to exploitation by motivated actors.¹⁴² The literature on heuristics and biases in decision making can provide a good foundation for understanding particular patterns of decision making in the area of risk. Limits on the rationality of human decision making have been discussed at length elsewhere, and behavioral scientists have found a systematic lack of rationality in how individual members of the public respond to potential dangers.¹⁴³

B. Characteristics of the Communication Context

Over the past century, the number of sources of information about risk has grown tremendously. Whereas risk information used to be conveyed by public officials, carried in newspaper stories, and, most commonly, traded during face-to-face communication between members of society, today, the risk communication picture is increasingly multifaceted and complex.¹⁴⁴ Some commentators opine

primarily on information about the case at hand, paying relatively little attention to background information about other cases.”).

¹⁴¹ See Peter M. Todd & Gerd Gigerenzer, *What We Have Learned (So Far)*, in SIMPLE HEURISTICS THAT MAKE US SMART 357 (Gerd Gigerenzer et al. eds., 1999) (explaining how the use of heuristics involves information search, stop search, and decision).

¹⁴² See Jon D. Hanson & Douglas A. Kysar, *Taking Behavioralism Seriously: Some Evidence of Market Manipulation*, 112 HARV. L. REV. 1420, 1456 (1999) (listing the ways in which advertisers can exploit features of human decision making—particularly with respect to product-related risks—for financial gain).

¹⁴³ See generally BARRY GLASSNER, *THE CULTURE OF FEAR: WHY AMERICANS ARE AFRAID OF THE WRONG THINGS* (2000); SLOVIC, *supra* note 4; COHL, *supra* note 14.

¹⁴⁴ See William Leiss, *Three Phases in the Evolution of Risk Communication Practice*, 545 ANNALS AM. ACAD. POL. & SOC. SCI. 85 (1996) (tracking the evolution of risk communication during the last twenty years). See generally Baruch Fischhoff, *Risk*

that the growth in the number of communication forms have contributed to the advent of the “risk culture” of today. According to David Altheide,

Fear is more visible and routine in public discourse than it was a decade ago. . . . This communication environment is part of our everyday world; it is popular culture and we are it, and we like it; we play with it; we play with the reporters and the institutional news sources who exploit the fear script for their own benefits.¹⁴⁵

Differences in how members of the public receive information about risks mean that there are myriad possible sources of “input.” It also means that there is potential for these sources to interact and amplify or attenuate perceptions about risks. For example, if Susan hears her neighbor express concern about negative health effects from hormones in beef, she can seek out more information on the Internet. On the Internet, she will no doubt discover a range of information sources, from online news stories, to individuals expressing views via blogs or in chat rooms, to official reports issued by the National Institutes of Health. Depending upon which sites she reads, she will be comforted or increasingly concerned. The story is made more complicated still by the fact that various patterns of communication led to the views expressed on the websites available to Susan. Thus, the picture of communication about risk is an increasingly complex one consisting of expert opinion, media selection and promulgation, and social discourse.

Risk communication research is a body of work that has grown out of the collective attempt of investigators, agency heads, and political leaders to carry on a productive dialogue with the public about various risks.¹⁴⁶ Researchers have composed many of the writings

Perception and Communication Unplugged: Twenty Years of Process, 15 RISK ANALYSIS 137 (1995). Fischhoff identifies a series of seven different developmental stages in risk communication:

- (1) All we have to do is get the numbers right,
- (2) All we have to do is tell them the numbers,
- (3) All we have to do is explain what we mean by the numbers,
- (4) All we have to do is show them that they’ve accepted similar risks in the past,
- (5) All we have to do is show them that it’s a good deal for them,
- (6) All we have to do is treat them nice,
- (7) All we have to do is make them partners.

Id. at 138 tbl.1.

¹⁴⁵ Altheide, *supra* note 13, at 664.

¹⁴⁶ See, e.g., Lee M. Thomas, *Foreword* to EFFECTIVE RISK COMMUNICATION: THE ROLE AND RESPONSIBILITY OF GOVERNMENT AND NONGOVERNMENT ORGANIZATIONS

available on risk communication with the purpose of providing investigators, political leaders, and agency administrators with strategic guidance regarding effective risk communication. Another broad area of research has focused on the impact of the media on how members of society view risks.¹⁴⁷ Finally, research on the influence of heuristics and biases has revealed the importance of features of the communication context for resulting risk perception.¹⁴⁸ Findings from each of these bodies of scholarship can inform a comprehensive theory of how risk communication and idea exchange ultimately influences risk perception.

C. *The Role of Facilitators*

H.L. Mencken once said that “the whole aim of practical politics is to keep the populace alarmed (and hence clamorous to be led to safety) by an endless series of hobgoblins, most of them imaginary.”¹⁴⁹ Closely related to both the bounded rationality literature and to the work on risk communication is consideration of strategic attempts to influence mass behavior. Timur Kuran and Cass Sunstein dub players who engage in public opinion crafting, “availability entrepreneurs.”¹⁵⁰ The term “availability entrepreneur” connotes a particular ideological slant or “pet cause.” This Article uses the term “facilitator” in place of “entrepreneur” because the media, which plays a significant role in shaping public beliefs, tends to be driven by different considerations than traditional entrepreneurs such as watchdog groups, grassroots organizations, and industry leaders. The term “facilitator” includes the availability entrepreneur (as conceived of by Kuran and Sunstein) as well as anyone who stands to benefit from promulgating information for purposes garnering public attention. The media is a prime example.¹⁵¹

(Vincent T. Covello et al. eds., 1987) (“One of the greatest challenges facing those concerned with health and environmental risks is how to carry on a useful public dialogue on these subjects. In a democracy, it is the public that ultimately makes the key decisions on how these risks will be controlled. The stakes are too high for us not to do our very best.”).

¹⁴⁷ Altheide, *supra* note 13, at 664; *see also* Anders af Wählberg & Lennart Sjöberg, *Risk Perception and the Media*, 3 J. RISK RES. 31 (2000).

¹⁴⁸ Kasperson et al., *supra* note 1, at 178; *see also* Slovic, *supra* note 8; Charles Vlek & Pieter-Jan Stallen, *Judging Risks and Benefits in the Small and in the Large*, 28 ORGANIZATIONAL BEHAV. & HUMAN PERFORMANCE 235 (1981).

¹⁴⁹ HENRY LOUIS MENCKEN, IN DEFENSE OF WOMEN 53 (1922).

¹⁵⁰ *See* Kuran & Sunstein, *supra* note 23, at 701.

¹⁵¹ This Article discusses the media at length *infra* Part IV.

During a political campaign season or any time an individual or group is particularly interested in advancing an agenda on the national stage, there is an increased likelihood of risks of being publicized.¹⁵² Facilitators commonly frame issues in a manner that makes the danger appear particularly imminent and destructive.¹⁵³ Often there will be a battle between facilitators with opposing agendas, and facilitators will play up the dangers inherent in one risk, in defense of other potential hazards.¹⁵⁴ Facilitators' motivations are influenced by temporal factors and cultural factors among others. The success of such facilitators in exciting the populace depends upon conditions such as the state of current technology, the degree to which the population has been primed to fear certain activities, and other factors that make members of society receptive to risk communications.

D. Characteristics of the Risk

We can think about the risks we face on two different levels: the micro (individual hazard) level and the macro (general fear of hazards) level.¹⁵⁵ One category of risk perception involves risks that individual citizens routinely encounter. Members of the public view some classes of hazards as particularly threatening and other classes of hazards as relatively innocuous.¹⁵⁶ Psychometric risk researchers seek to explain differences in attitudes about various types of potential hazards, to identify which potential risks cause the most concern, and to identify why they do so.¹⁵⁷ As previously noted, today's risks are widely characterized as particularly challenging for several reasons. New technologies pose particular hazards because their dangers may not be discovered for some period of time.¹⁵⁸ Pressures to implement new technologies and the potential for financial gain mean that manufacturers and developers may downplay

¹⁵² Kasperson et al., *supra* note 1, at 185. It is tempting to draw the conclusion that public concern over a risk that is publicized as part of a political strategy is, by definition, overblown. However, that is not necessarily the case. See Wilson & Fuchs, *supra* note 90.

¹⁵³ See Paul Slovic et al., *Decision Processes, Rationality and Adjustment to Natural Hazards*, in SLOVIC, *supra* note 4, at 7.

¹⁵⁴ BECK, *supra* note 9, at 31.

¹⁵⁵ Wahlberg & Sjöberg, *supra* note 147, at 37.

¹⁵⁶ Some examples are nuclear waste (high), automobile use (low), terrorism (high), and global warming (changing).

¹⁵⁷ See Fischhoff et al., *supra* note 28.

¹⁵⁸ See Slovic, *supra* note 8.

the potential for harm or may curtail research efforts.¹⁵⁹ Threats to health and well-being from new products and processes may be difficult to assess, even with substantial research findings.¹⁶⁰ In particular, hazards associated with novel inventions can sometimes have negative impacts into the future, threatening the health of the nation's children and grandchildren.¹⁶¹

When it comes to individual risk assessment, there are substantial discrepancies in the perceived seriousness of various potential harms. As discussed previously, the most common method of studying risk perception is to ask individuals to assess various potential hazards in order to determine which are perceived to pose the greatest risk.¹⁶² The psychometric study of risk has also included attempts to determine which characteristics of a hazard or hazard situation are likely to trigger concern.¹⁶³ A number of empirical investigations of risk preference have revealed some reliable patterns of public (as opposed to expert) risk perception. Risks that are assumed involuntarily, and those that are associated with unfamiliar sources and that have potentially catastrophic consequences (such as risks posed by nuclear energy) are particularly likely to cause fear.¹⁶⁴ Conversely, risks associated with familiar activities in which the potential for harm is localized and in which the risk is voluntarily

¹⁵⁹ See Dorothy Nelkin, *Communicating Technological Risk: The Social Construction of Risk Perception*, 10 ANN. REV. PUB. HEALTH 95, 96 (1989) (reviewing the issues involved in communicating risk to the public).

¹⁶⁰ See Kasperson & Kasperson, *supra* note 18, at 96.

The familiar scourges of famine, disease, and pestilence no longer dominate the risk experience, which, instead, now involves negotiating a new and perplexing array of global threats associated with modern armaments, chemicals and radiation often invisible to the senses, contaminants whose effects surface only after decades or generations, hazards created by peoples and technologies in distant part of the globe, and harms arising from the flow and control of information.

Id.

¹⁶¹ See BECK, *supra* note 9, at 22 (“Atomic accidents are accidents no more in the limited sense of the word ‘accident.’ They outlast generations.” (internal parenthetical omitted)).

¹⁶² See *id.*

¹⁶³ Chauncey Starr wrote what is arguably the earliest research using this method. See Chauncey Starr, *Social Benefit Versus Technological Risk*, 165 SCIENCE 1232 (1969) (positing that society has, by trial and error, determined an acceptable level of safety for many common activities, and calling this theory the “revealed preference” approach).

¹⁶⁴ See generally SLOVIC, *supra* note 4; Fischhoff et al., *supra* note 28; Kasperson & Kasperson, *supra* note 18; Kasperson et al., *supra* note 1.

assumed, seem less threatening.¹⁶⁵ By examining beliefs about latent dangers, some critical patterns emerge that may have predictive potential in the broader public risk perception context.

E. Characteristics of the Targets and Victims

1. The Relationship Between Target and Victim

One of the primary differences between traditional risk analysis, on the one hand, and psychometric, cultural, or decision theory-based approaches to risk management, on the other, is the source of the data. Whereas traditional risk analysis is based upon scientific data and expert analysis, more recent approaches have solicited the views of nonexperts, so-called “average citizens.”¹⁶⁶ Intriguing and potentially critical questions arise with respect to whether those evaluating risks are “stakeholders.” If the person evaluating the risk is also a potential victim of that risk (a stakeholder), he or she may predictably respond differently to the risk than would a non-stakeholder. An individual may also be a stakeholder if he or she has a strong interest in the well-being of a potential victim (as is true in the case of a parent-child relationship).

Not surprisingly, whether an individual who is evaluating a risk is a stakeholder makes a difference in how that individual perceives the risk. A stakeholder experiences more emotion with respect to a risk when that risk is self-relevant.¹⁶⁷ Emotions, in turn, play an important role not only in how much people care about addressing harms, but also in how they evaluate future outcomes. Anger, for instance, is correlated with an optimistic view, while sadness is correlated with pessimism.¹⁶⁸ To the extent that emotions are heightened in stakeholders, existing predilections will be exaggerated.¹⁶⁹ Interestingly, however, respondents avoid

¹⁶⁵ See generally SLOVIC, *supra* note 4; Fischhoff et al., *supra* note 28; Kasperson et al., *supra* note 1; Slovic, *supra* note 8.

¹⁶⁶ See Slovic, *supra* note 37.

¹⁶⁷ See Jeremy A. Blumenthal, *Emotional Paternalism*, 35 FLA. ST. U. L. REV. 1, 70 (2007) (suggesting that strong emotional reactions to self-relevant risks might lead legislatures to take action to prevent affected members of the public from making hasty, ill-advised decisions).

¹⁶⁸ Jennifer S. Lerner et al., *Effects of Fear and Anger on Perceived Risks of Terrorism: A National Field Experiment*, 14 PSYCHOL. SCI. 144, 148 (2003) (“Experiencing more anger triggered more optimistic beliefs; experiencing more fear triggered greater pessimism.”).

¹⁶⁹ See Kahan, *supra* note 26, at 757 (“[P]erceptions of danger naturally feed upon one another among persons who share cultural commitments. This form of group polarization

characterizing themselves as stakeholders when possible. When there is uncertainty as to the scope and direction of a risk, respondents are significantly more likely to see others as at risk than the respondents are to see themselves as potential victims.¹⁷⁰

The risk perception picture is more complicated than the stakeholder–non-stakeholder dichotomy would suggest, because even citizens who are not directly affected by a particular threat may care deeply about how government or private industry responds to the harm. Specifically, risks to subgroups within the United States are likely to have special significance for the American population more generally because how our government protects its citizens is a matter of concern to the society as a whole.¹⁷¹ The oft-cited Love Canal disaster is a situation in which the public at large received (and sought out) information about dangers facing residents of Love Canal. Ultimately, the question for Americans watching the Love Canal events unfold was, how does the U.S. government respond when a toxic waste site is discovered under a settled community?¹⁷² A more recent example is Hurricane Katrina. The government’s response to Hurricane Katrina was no doubt unsettling to Americans, not only because they felt outrage over injustices or empathy for the victims, but also because the American public witnessed the failure of its

in risk perceptions, then, is another dynamic that can be explained consistently with the view that emotion is a form of expressive perception and not a cognitive bias.” (internal citation omitted)).

¹⁷⁰ Lerner et al., *supra* note 168, at 149 tbl.3. Lerner also found that the effects of emotion on risk perception generalizes from the perceived likelihood of self-relevant outcomes (“will it happen to me?”) to other-relevant outcomes. *Id.* at 148. This tendency is related to the optimism bias, the tendency to attribute superior traits to one’s self and to predict positive outcomes for one’s own future. See K. Patricia Cross, *Not Can, But Will College Teaching Be Improved?*, 1977 *NEW DIRECTIONS FOR HIGHER EDUC.* 1, 4 (citing a study indicating that ninety-four percent of college professors think that their work is above average); Laurie Larwood & William Whittaker, *Managerial Myopia: Self-Serving Biases in Organizational Planning*, 62 *J. APPLIED PSYCHOL.* 194, 194 (1977) (reporting that management students overestimated the likelihood that they will outperform competitors); see also John R. Chambers & Paul D. Windschitl, *Biases in Social Comparative Judgments: The Role of Nonmotivated Factors in Above-Average and Comparative-Optimism Effects*, 130 *PSYCHOL. BULL.* 813, 813 (2004).

¹⁷¹ See Verna L. Williams, *Reading, Writing, and Reparations: Systemic Reform of Public Schools as a Matter of Justice*, 11 *MICH. J. RACE & L.* 419, 423 (2006) (“[I]ndividuals expect protection from the state For the government itself to cause harm adds an element of outrage generally not present in purely private wrongdoing.” (quoting DINAH SHELTON, *REMEDIES IN INTERNATIONAL HUMAN RIGHTS LAW* 50 (1999))).

¹⁷² LOIS MARIE GIBBS, *LOVE CANAL* 1 (1982).

government to adequately respond to the needs of its citizens.¹⁷³ Risk events provide citizens with opportunities to assess their government's ability and willingness to protect members of society. The signals sent by government agencies and actors following a disaster can have long-lasting consequences for citizen risk perceptions, as this Article discusses further in Section IV.

2. *Language as a Product of Culture*

The term "cultural factors" includes a complex set of considerations relating to the characteristics of a population influenced by shared patterns of behaviors and interactions, cognitive constructs, and affective understanding learned through socialization within a particular group of people.¹⁷⁴ Although individuals within a particular culture have a variety of individual experiences, worldviews, and belief systems, they share common social values out of which arise common understandings of important aspects of society.¹⁷⁵

Language is a critical factor in how individuals understand risk.¹⁷⁶ Language is more than the medium through which probabilities about outcomes is conveyed; language is a product of culture and subcultures and can therefore imbue new meaning in the process of serving as a conduit for information. For this reason, terminology becomes critical. Certain terms and phrases carry with them culturally defined meanings and have moral or political dimensions

¹⁷³ See Russell S. Sobel & Peter T. Leeson, *Government's Response to Hurricane Katrina: A Public Choice Analysis*, 127 PUB. CHOICE 55, 56 (2006), available at http://www.peterleeson.com/Hurricane_Katrina.pdf; see also Larry Cox, *A Movement for Human Rights in the United States: Reasons for Hope*, 40 COLUM. HUM. RTS. L. REV. 135, 145 (2009) (citing the desire for change sparked by "the outrage over the abandonment of people of color during Hurricane Katrina").

¹⁷⁴ The term "culture" has had many, many different definitions. See, e.g., A.L. KROEBER & CLYDE KLUCKHOHN, *CULTURE: A CRITICAL REVIEW OF CONCEPTS AND DEFINITIONS* (1952) (detailing 164 separate definitions of culture).

¹⁷⁵ See, e.g., COMMUNICATION BETWEEN CULTURES 51 (Larry A. Samovar & Richard E. Porter eds., 1991) ("Culture is the collective programming of the mind which distinguishes the members of one category of people from another.") (quoting Geert Hofstede, *National Cultures and Corporate Cultures* (Dec. 4, 1984) (unpublished manuscript)); see also MULTICULTURAL EDUCATION (James A. Banks & Cherry A. McGee Banks eds., 1989); JOHN PAUL LEDERACH, *PREPARING FOR PEACE: CONFLICT TRANSFORMATION ACROSS CULTURES* (1995) (noting that culture is "the shared knowledge and schemes created and used by a set of people for perceiving, interpreting, expressing, and responding to the social realities around them").

¹⁷⁶ See Nelkin, *supra* note 159, at 95.

that can be quite powerful.¹⁷⁷ Semantics contribute to risk perception in powerful ways, particularly when language is emotive.¹⁷⁸ Alternatively, language is used to minimize the seriousness of a situation or to rob an issue of its emotional content.¹⁷⁹ For example, in order to make the death penalty less frightening, advocates of the death penalty have developed “sterile” or “medical” terms for the procedure by which the state administers a death sentence.¹⁸⁰ Vivid language has also been used to evoke emotions in the recipient in an effort to provoke certain behaviors. For example, public health campaigns have used evocative language (and images) to convey messages about the consequences of cigarette smoking, to tout the benefits of breast-feeding, and to encourage safe-sex practices.¹⁸¹ Previously entrenched cultural standards and values are often used strategically to sell the message. For example, a breast-feeding campaign may draw on images of motherhood that trigger the culturally defined role of woman as self-sacrificing provider and

¹⁷⁷ See Susan Moeller, *Jumping on the US Bandwagon for a “War on Terror,”* YALE GLOBAL ONLINE, June 21, 2007, <http://yaleglobal.yale.edu/content/jumping-us-bandwagon-war-terror> (reporting on a study that found that the U.S. media had reported on Pakistan in terms that were biased and portrayed a monolithic population, rather than the more accurate complex and varied culture).

¹⁷⁸ Patricia Greenspan, *Emotions, Rationality, and Mind/Body*, in PHILOSOPHY AND THE EMOTIONS 122 (Anthony Hatzimoyssis ed., 2003) (“Affect itself essentially evaluates something as in some respect good or bad—good or bad for the organism (to be sought after or avoided), in the most primitive cases. With cognitive development this evaluative content takes on the possibilities of semantical richness that we associate with propositions.”).

¹⁷⁹ See, e.g., Cass R. Sunstein, *On the Divergent American Reactions to Terrorism and Climate Change*, 107 COLUM. L. REV. 503, 534 (2007) (“White House officials under President Bush asked executive officials to use the term “climate change” in preference of “global warming,” evidently with the belief that “climate change” is abstract and relatively neutral . . .”).

¹⁸⁰ An example is the language typically used to describe the death penalty. See, e.g., Michael Manville, *Death Becomes Us: Why Americans Support Capital Punishment*, FREEZERBOX, Sept. 13, 2000, available at <http://www.freezerbox.com/archive/article.php?id=233> (asserting that the language we use to discuss death makes it easier for death penalty subjects to be used to unite the population behind a pro-death-penalty stance and to use the death penalty for political purposes).

¹⁸¹ One example of a campaign that used rhetoric and imagery in this way arose out of an effort to get women to breast-feed their infants. Joan B. Wolf, *Is Breast Really Best? Risk and Total Motherhood in the National Breastfeeding Awareness Campaign*, 32 J. HEALTH POL. POL’Y & L. 595, 595 (2007) (“From June 2004 to April 2006, cosponsored by the U.S. Department of Health and Human Services and the Ad Council, the National Breastfeeding Awareness Campaign (NBAC) warned women that not breast-feeding put babies at risk for a variety of health problems. ‘You’d never take risks before your baby is born. Why start after?’ asked televised public service announcements over images of pregnant women logrolling and riding a mechanical bull.”).

protector.¹⁸² The effect of these campaigns—when they are successful—is often to create new associations that become fixed in cultural understandings.

These cultural understandings vary from subgroup to subgroup within a population; subgroups often have their own set of values and priorities. Subgroups can consist of members of a particular trade or profession, immigrant populations, ethnic or racial groups, religious groups, or inhabitants of particular neighborhoods or locales.¹⁸³ The features that define the group serve as the basis for communication. For example, when dairy farmers exchange information, it is most often about aspects of the trade; when parents of children attending a particular school see one another at a parent-teacher organization meeting, they tend to talk about their children and education issues.

One robust finding from empirical investigations of attitude formation is the tendency of like-minded individuals to reinforce one another's beliefs.¹⁸⁴ Group polarization occurs in the context of risk perception as well. Accordingly, "a group of people who fear the effects of second-hand smoke, or who believe that pesticides carry significant risks, is likely, after discussion, to believe that the health dangers here are extremely serious."¹⁸⁵ So too, a group of people who tend to think similarly when it comes to environmental issues will be more extreme in these views after having discussed the issues.¹⁸⁶ Group polarization is related to a concept called affiliation

¹⁸² See Rebecca Kukla, *Ethics and Ideology in Breastfeeding Advocacy Campaigns*, 21 HYPATIA 157 (2006); see also Orit Avishai, *Managing the Lactating Body: The Breast-Feeding Project and Privileged Motherhood*, 30 QUALITATIVE SOC. 135 (2007).

¹⁸³ See Dora C. Lau & J. Keith Murnighan, *Demographic Diversity and Faultlines: The Compositional Dynamics of Organizational Groups*, 23 ACAD. MGMT. REV. 325, 326, 329 (1998) (explaining that fault lines are hypothetical dividing lines that may split a group into subgroups based on attributes such as age, personal values, personality, race, and job status).

¹⁸⁴ See Molly J. Walker Wilson, *A Behavioral Critique of Command-and-Control Environmental Regulation*, 16 FORDHAM ENVTL. L. REV. 223, 233 (2005) ("Research findings have suggested that groups tend to be more extreme in their views following group discussion.").

¹⁸⁵ Cass R. Sunstein, *The Laws of Fear* 14 (John M. Olin Law & Economics Working Paper No. 128 (2d Series)); see also CASS R. SUNSTEIN, RISK AND REASON: SAFETY, LAW, AND THE ENVIRONMENT 88 (2002) ("If people tend to be concerned about global warming, . . . tend to believe that . . . cancer . . . lies in the use of pesticides, . . . those same people will tend, after discussion, to have a heightened fear of [these things]."); Cass R. Sunstein, *The Law of Group Polarization*, 10 J. POL. PHIL. 175, 176 (2002) (explaining how polarization occurs when members of a deliberating group move toward a more extreme point as a result of deliberation caused by the members' predisposed views).

¹⁸⁶ Wilson, *supra* note 184.

bias, whereby experts tend to interpret scientific findings in a manner that benefits their employers.¹⁸⁷ The inclination to gravitate toward the view of other members of a group is called affiliation bias¹⁸⁸ and is evidence of irrationality in human decision making, but the evolutionary advantage of this tendency is clear, given that humans are social animals who rely on one another to unravel complex problems and accomplish higher tasks. The power and prevalence of the affiliation bias can hardly be overstated, and its effects on risk responses are worthy of serious consideration.

F. Other Characteristics: Contextual and Temporal Factors

1. Contextual Factors

Several factors exogenous to the risk and target can influence risk perceptions. Strictly speaking, context, defined broadly, can be conceived of as similar to or the same as culture. For example, one aspect of the risk context in Western societies is our system of food production.¹⁸⁹ Our society has changed from one in which we were primarily focused on producing enough to sustain the population to an industrialized society in which constantly developing technologies provide more food, clothing, and shelter to a greater percentage of the population, while simultaneously introducing previously unknown risks.¹⁹⁰ Technologies exert pressures on culture; cultures are shaped by technologies. And, technologies are, to a large extent, supported

¹⁸⁷ See Nancy Kraus et al., *Intuitive Toxicology: Expert and Lay Judgments of Chemical Risks*, in SLOVIC, *supra* note 4, at 311–12.

¹⁸⁸ *Id.* at 311.

¹⁸⁹ See WILLIAM B. GUDYKUNST & STELLA TING-TOONEY, CULTURE AND INTERPERSONAL COMMUNICATION 30 (1988) (arguing that the definition of “culture” is a debated issue and has many different definitions in the literature, including “a script or schema shared by a large group of people”); see also ALLAN G. JOHNSON, THE BLACKWELL DICTIONARY OF SOCIOLOGY: A USER’S GUIDE TO SOCIOLOGICAL LANGUAGE 73 (2d. ed., 2000) (“Culture is the accumulated store of symbols, ideas, and material products associated with a social system, whether it be an entire society or a family. . . . [I]t is one of the major elements of every social system and a key concept in defining the sociological perspective.”); 1 SURVEY OF SOCIAL SCIENCE: SOCIOLOGY SERIES 436 (Frank N. Magill ed., 1994) (“[Culture is] human traditions and customs that are transmitted through learning between generations.”); A DICTIONARY OF SOCIOLOGY 47 (G. Duncan Mitchell ed., 1979) (“Culture . . . refers to that part of the total repertoire of human action (and its products), which is socially as opposed to genetically transmitted.”).

¹⁹⁰ See BECK, *supra* note 9, at 19 (linking the end of the “society of scarcity” with the advent of a new society in which novel productive forces resulted in new risks “unleashed to an extent previously unknown”).

or stifled by cultural beliefs.¹⁹¹ One particularly apt example is cloning. Value-laden judgments about the wisdom of investing in, and even permitting, such a technology have influenced the state of the science in this area.¹⁹²

Technology can also interact with geography with interesting results. In the modern, postindustrial world, pollutants generated in the midwestern United States travel in a predictable path to the northeastern states, and effluents from China threaten the well-being of people living in Australia.¹⁹³ Some risks are geographically localized, and others defy geography and pose dangers to the entire global environment and all who inhabit it.¹⁹⁴ Accordingly, geographic features and location of a population group can help to shape which risks become prominent to members of that society.

2. *Temporal Factors*

Individuals become aware of potential hazards in a variety of ways. Sometimes the publication of a scientific study reveals a new health threat.¹⁹⁵ Following an environmental disaster, the government, the media, and public interest groups may all communicate information

¹⁹¹ See Roger Roots, *The Dangers of Automobile Travel: A Reconsideration*, 66 AM. J. ECON. & SOC. 959, 959 (2007) (demonstrating that despite being the leading cause of death, the greatest killer of children and young adults, and historically criticized by experts as unsafe and inefficient, the automobile has persisted due to America's "love affair" with personal transportation); see also Lori Khan, *Ethics Analysis of the Human Embryonic Stem Cell Research Debate*, 5 ONLINE J. HEALTH ETHICS (2008), available at <http://ssrn.com/abstract=1119402> (demonstrating that new technologies, like stem cell research, may be hotly debated and stifled due to opposition from powerful cultural entities, in this case religious institutions and political parties).

¹⁹² See Kasperson et al., *supra* note 1, at 178 ("Risk is a bellwether in social decisions about technologies.").

¹⁹³ Press Release, NASA, NASA Satellite Measures Pollution from East Asia to North America (Mar. 17, 2008), http://www.nasa.gov/topics/earth/features/pollution_measure.html; LiveScience Staff, *Pollution Travels the Globe, Study Confirms*, LIVESCIENCE (Sept. 29, 2009, 11:23 AM), <http://www.livescience.com/environment/090929-foreign-pollution.html> (last visited Sept. 30, 2011); Michael Reilly, *Air Pollution Travels, Kills Thousands Annually*, DISCOVERY NEWS (Aug. 14, 2009), <http://dsc.discovery.com/news/2009/08/14/air-pollution-overseas.html>.

¹⁹⁴ See BECK, *supra* note 9, at 27 (citing DDT found in arctic penguins as an example of the globalization of risk).

¹⁹⁵ For example, a report on the effects of long-term exposure to bisphenol A (BPA) triggered concern among many, particularly parents of children, over the use of baby bottles and childproof plastic cups. See NAT'L TOXICOLOGY PROGRAM, U.S. DEP'T OF HEALTH & HUMAN SERVS., NTP-CERHR, MONOGRAPH ON THE POTENTIAL HUMAN REPRODUCTIVE AND DEVELOPMENTAL EFFECTS OF BISPHENOL A, NIH Publication No. 08-5994 (2008). Kasperson provides some examples of the types of events that can trigger communication about risk. Kasperson & Kasperson, *supra* note 18, at 96.

about the event.¹⁹⁶ How the first-line receivers interpret and subsequently communicate this information influences perceptions of targets multiple iterations removed.¹⁹⁷ Thus, order effects—the sequence in which individuals receive the information and how initial recipients disseminate the information—are critical. Because the initial recipients of hazard information have particular power to impact public perceptions, high-level officials in government, nongovernment organizations, and agencies have enormous influence in filtering information for public consumption.¹⁹⁸

G. The Risk Decision Structure

Perceptions are one thing, behaviors are quite another. As social science has amply demonstrated, beliefs do not always translate into action.¹⁹⁹ As empirical studies have revealed, “[A]ttitudes need not be related to behaviors. If they are, then they may be trailing rather than leading indicators. Indeed, psychology’s self-perception theory tracks the ways in which people infer their attitudes from their

¹⁹⁶ The public outrage and concern following the Exxon Valdez oil spill is one example of an environmental disaster that triggered widespread concern over the risks posed to human and wildlife health by oil tankers. Wilson & Fuchs, *supra* note 90, at 2200–06.

¹⁹⁷ Kasperson et al., *supra* note 1, at 180.

¹⁹⁸ James Mason discusses the role of government actors in responsible risk communication. See James O. Mason, *The Federal Role in Risk Communication and Public Education*, in EFFECTIVE RISK COMMUNICATION, *supra* note 146, at 19 (“The government’s responsibility in risk communication is to help ensure that decision of public policy and personal practice are based on the best available information.”).

¹⁹⁹ See Cass R. Sunstein, *Deliberative Trouble? Why Groups Go to Extremes*, 110 YALE L.J. 71, 86–88 (showing that group members tend to ignore their own feelings when in a group, and, as a result, riskier shifts occur in judgment); see also John M. Darley & Bibb Latané, *Bystander Intervention in Emergencies: Diffusion of Responsibility*, 8 J. PERSONALITY & SOC. PSYCHOL. 377, 377 (1968) (stating that rational and irrational fears about what might happen if they intervene, including physical harm, public embarrassment, involvement with police procedures, lost work days and jobs, and other unknown dangers, sometimes keep people from assisting in what they believe to be emergencies); Rob Bond & Peter B. Smith, *Culture and Conformity: A Meta-Analysis of Studies Using Asch’s (1952b, 1956) Line Judgment Task*, 119 PSYCHOL. BULL. 111 (1996) (analyzing a famous study demonstrating that despite believing a line to be a certain length, when presented with the option of conforming to statements of confederates, most will do so at odds with their own beliefs); Stanley Milgram, *Behavioral Study of Obedience*, 67 J. ABNORMAL AND SOC. PSYCHOL. 371 (1963) (demonstrating that despite an unwillingness to continue the experiment and a belief that real harm was being done, subjects continued to be obedient to experimenter over these beliefs); Irving L. Janis, *Groupthink*, PSYCHOL. TODAY, Nov. 1971, at 43 (showing that individuals cognitively ignore their own beliefs and concerns in situations in which they more highly desire group cohesion and cooperation and that this can lead to adverse consequences).

behavior (“If I’m doing this, it must be because I like it”).²⁰⁰ Whether members of the public act in ways that are consistent with their purported views involves a second set of analysis and determinations. For example, Sunstein has pointed out that, as in the case of reputational cascades, individuals often act on *other* people’s perceptions—or at least champion the “common wisdom”—independent of their own private attitudes.²⁰¹ A full analysis of public risk perception requires an examination of how the decision structure can influence the behavior outcome in light of the adopted view.

Risk perception is relevant for purposes of two categories of behavior-based outcomes. One is personal practice and the other is public policy.²⁰² The former is an area where risk perception *can* (although it often doesn’t) directly influence exposure to a potential hazard. Public risk perception influences the latter when the public puts pressure on policy makers to take action in the form of legislation, regulation, or resource allocation, in order to influence perceived threats.²⁰³ In a strict dictatorship, absent a revolt or a coup, the discontent of the people will have little direct impact on how a government chooses to protect (or fails to protect) its citizens. A well-functioning democracy, on the other hand, should be responsive to the wishes and needs of the populace.²⁰⁴ In the context of this type of political environment, public perception often—for good or for

²⁰⁰ Baruch Fischhoff & Ilya Fischhoff, *Will They Hate Us? Anticipating Unacceptable Risks*, 3 RISK MGMT. 7, 11 (2001); see also Daryl J. Bem, *Self Perception Theory*, in 6 ADVANCES IN EXPERIMENTAL SOCIAL PSYCHOLOGY 1 (Leonard Berkowitz ed., 1972); Russel H. Fazio, *Self-Perception Theory: A Current Perspective*, in 5 SOCIAL INFLUENCE: THE ONTARIO SYMPOSIUM 129 (Mark P. Zanna et al. eds., 1987); Daryl J. Bem, *Self-Perception: An Alternative Interpretation of Cognitive Dissonance Phenomena*, 74 PSYCHOL. REV. 183 (1967); Walter B. Cannon, *The James-Lange Theory of Emotions: A Critical Examination and an Alternative Theory*, 100 AM. J. PSYCHOL. 567 (1987) (explaining that emotions follow physical reactions (i.e., because my body is crying I must be sad)).

²⁰¹ See generally SUNSTEIN, *supra* note 97, at 67.

²⁰² See Mason, *supra* note 198.

²⁰³ See generally Wilson & Fuchs, *supra* note 90.

²⁰⁴ THE DECLARATION OF INDEPENDENCE para. 2 (U.S. 1776) (“Governments are instituted among Men, deriving their just Powers from the Consent of the governed, that whenever any Form of Government becomes destructive of these Ends, it is the Right of the People to alter or to abolish it, and to institute new Government, laying its Foundation on such Principles, and organizing its Powers in such Form, as to them shall seem most likely to effect their Safety and Happiness.”)

ill—impacts policy adoption.²⁰⁵ The political and power structure of a society becomes an important factor in whether the beliefs of the members of society translate to government action. Even in the context of a genuine democracy, the translation of public belief to political action is imperfect, of course. For one thing, democratic governments are rarely efficient law-making structures.²⁰⁶ For another, policy makers are influenced by the same variables as other members of society, but a separate, if related, set of biases may guide them.²⁰⁷ Both because the populace exerts pressure on lawmakers and because lawmakers are themselves members of the society, public risk perception is at the heart of risk policy decisions.²⁰⁸ But, to say this is not to suggest that lawmakers routinely consider the risk preferences of members of the population when making risk decisions. Rather, the public's influence tends to surface in a random and haphazard fashion, such as when a particular risk is suddenly brought to light, or when a particularly bad policy decision results in public outrage.²⁰⁹ The role of individual members of society need not

²⁰⁵ See James Forman, Jr., *Why Care About Mass Incarceration?*, 108 MICH. L. REV. 993 (2010) (arguing that despite failure of the tough-on-crime approach, politicians continue to ratchet up penalties for criminals, despite mounting evidence that such practices do not work, in order to win votes from a public that perceives an increase in crime); see also Kahan, *supra* note 26 (demonstrating that society may hotly debate and stifle new technologies, like stem cell research, due to opposition from powerful cultural entities, in this case religious institutions and political parties).

²⁰⁶ See Forman, *supra* note 205 (describing public policy, influenced by a majority for election purposes, leading to bad outcomes); Cynthia L. Fountaine, Note, *Lousy Lawmaking: Questioning the Desirability and Constitutionality of Legislating by Initiative*, 61 S. CAL. L. REV. 733 (1988) (demonstrating that democracy is inefficient because voters are ignorant, it suffers from procedural defects, there is a problem with majority tyranny, and it is too expensive, among other criticisms); see also Andrew B. Whitford & Soo-Young Lee, *The Efficiency and Inefficiency of Democracy in Making Governments Effective: Cross-National Evidence* (APSA 2009 Toronto Meeting Paper, 2009), available at <http://ssrn.com/abstract=1450743> (arguing that democracy may be inefficient for countries suffering from the “dictator/disorder” dilemma).

²⁰⁷ See W. KIP VISCUSI, *FATAL TRADEOFFS: PUBLIC AND PRIVATE RESPONSIBILITIES FOR RISK* (1992).

²⁰⁸ See Khan, *supra* note 191 (explaining that policy makers often make public policies to satisfy voters or unhappy sects, rather than using sound logic and empirical evidence); see also David A. Dana, *A Behavioral Economic Defense of the Precautionary Principle*, 97 NW. U. L. REV. 1315, 1329–30 (2003) (pointing out that public sentiment influences lawmakers); Forman, *supra* note 205.

²⁰⁹ An example of just such a situation was the response to Hurricane Katrina. Prior to the destruction from the storm, the American public was largely unaware and uninformed about the risk presented by the potential for large-scale storms to create severe flooding conditions. After August 29, 2005, when eighty percent of New Orleans was flooded, the media and lawmakers began to include public sentiment in the conversation. See, e.g., Robert L. Glicksman, *Global Climate Change and the Risks to Coastal Areas from*

be so limited. Members of the public are often as well equipped to evaluate hazards as are law and policy makers, if given access to pertinent information; they possess a range of talents and education that might be relevant to such situations, and they are heavily invested in such choices.

The foregoing list of considerations represents the collective focus of the various theoretical perspectives to date. The model proposed by this Article, which considers all of these perspectives as contributing to risk perception, goes far in achieving insight into this area but is not exhaustive. Risk is a sufficiently ubiquitous phenomenon that sources of risk are theoretically infinite, and theories regarding foundations and sources of concern are constantly evolving.²¹⁰ However, the factors listed here provide a solid starting point for a comprehensive discussion of antecedents to risk discernment among members of the public.

IV

CATEGORIES OF FACTORS INFLUENCING RISK PERCEPTION

Individuals' beliefs about risks are complex and rarely can be accurately represented in simple terms.²¹¹ The public has a broad concept of risk that incorporates a wide variety of considerations. This intricate network of factors relevant to public risk perception has been contrasted with the formal risk management models, which define riskiness based upon mortality and measured in probabilities.²¹² A careful method of examination of the risk perception scholarship, and a distillation of the major factors empirically demonstrated to influence judgments about and responses to dangers, yields a list of specific characteristics that can help predict

Hurricanes and Rising Sea Levels: The Costs of Doing Nothing, 52 LOY. L. REV. 1127, 1157–97 (2006) (emphasizing the importance of public reaction to Hurricane Katrina for future government response to the problem of climate change); see also *News Hour with Jim Lehrer: Public Opinion After Katrina* (Public television broadcast Sept. 9, 2005) (transcript available at http://www.pbs.org/newshour/bb/politics/july-dec05/opinion_9-09.html) (“National polls are showing a drop in public support not only for President Bush, but also highlighting strong disapproval of governments at all levels in their response to Hurricane Katrina.”).

²¹⁰ Fischhoff et al., *supra* note 28 (discussing two different risk approaches to a single risk analysis about whether a product is reasonably safe).

²¹¹ See generally Robert E. O'Connor et al., *Risk Perceptions, General Environmental Beliefs, and Willingness to Address Climate Change*, 19 RISK ANALYSIS 461 (1999) (discovering a complicated relationship between individuals' general environmental beliefs and their willingness to advocate for prevention in the area of climate change).

²¹² See generally Slovic, *supra* note 37.

when the public will become alarmed. At this stage of the project, these factors are listed, rather than being weighted. This is significant because the relative strength and level of influence of these factors is variable and unquestionably depends upon the unique combination of factors making up the interaction in any given situation.²¹³ This Article is designed to encourage future scholarship and commentary on public risk perception. In addition, the model presented here has significant practical use for law and policy formation. Understanding the particular antecedents to public anxiety can help risk managers make decisions that comport with public preferences. Government officials' having a specific set of predictors can assist in anticipating when widespread concern will arise and in managing public risk responses. This Article proposes that risk managers should consider the following factors in anticipating risk perception: priming or inoculation; features of the risk; cultural and personal identity factors; additional factors, such as cost/benefit analyses and concreteness of the risk or the public's ability to perceive the risk; and media influence.

A. *Priming or Inoculation*

One characteristic common to large segments of a population is the degree to which its members have been primed or inoculated regarding certain potential sources of danger. Much risk-related priming occurs on a wide-scale basis because sources of information about risks, and communication and experiences related to hazards, reach a broad segment of society.²¹⁴ Priming describes the phenomenon whereby exposure to a stimulus influences the response to a later stimulus.²¹⁵ Certain primes or triggers can help to determine cognitive and affective—or emotion-based—reactions to

²¹³ Results from some studies demonstrate sensitivity to context and covarying features that increase the difficulty in making detailed global predictions. *See e.g.*, RISK COMMUNICATION: A MENTAL MODELS APPROACH (M. Granger Morgan et al. eds., 2002).

²¹⁴ Generally, American citizens tune into the same national nightly news and cable news outlets, receive information from the same major newspapers, and are protected by the same federal agencies.

²¹⁵ *See* Cialdini et al., *supra* note 91 (“[P]riming effects incorporate the notion of spreading activation, which posits that similar concepts are linked together in memory within a network of nodes and that activation of one concept results in the spreading of the activation along the network to other related concepts.”).

later targets or events.²¹⁶ In risk perception terms, early experiences influence subsequent reactions to potential hazards.²¹⁷ The priming effect is based upon the fact that early impressions last. Put simply, impressions and preferences are sticky—and this is doubly so in the context of risk assessments.²¹⁸ Priming has been discussed in terms of both cognitions and emotions. Social psychologists coined the phrase “cognitive priming” to describe the process whereby one idea or practice becomes associated with other ideas or practices.²¹⁹ Priming is also an affect-based process. The focus on affect, as a powerful determinant in reactions to risk-related information, has gained increasing attention in the legal and extra-legal scholarship. Emotion is a powerful element of priming perceptions of future potential dangers, particularly when associated with fear.²²⁰

In risk perception literature, scholars discuss the priming of risk as “signaling.” Risk researchers have suggested that to the degree a person associates an event with a risk, that event can act as an important signal.²²¹ Paul Slovic cites the disaster at Three Mile Island (TMI) as a striking example of an event with high signal potential.²²² TMI did not result in any loss of human life, yet the

²¹⁶ Sheila T. Murphy & Robert B. Zajonc, *Affect, Cognition, and Awareness: Affective Priming with Optimal and Suboptimal Stimulus Exposures*, 64 J. PERSONALITY & SOC. PSYCHOL. 723, 723 (1993) (finding that millisecond-long encounters with negative or positive stimuli can produce nonspecific emotional reactions to unrelated stimuli).

²¹⁷ Empirical studies have linked fear to priming effects wherein the salience of an earlier event influences, or “primes,” future perception of risks. This phenomenon occurs in the context of international environmental law. See Robert W. Staiger & Frank A. Wolak, *Differences in the Uses and Effects of Antidumping Law Across Import Sources*, in THE POLITICAL ECONOMY OF AMERICAN TRADE POLICY 385 (Anne O. Krueger ed., 1996).

²¹⁸ See generally D.A. Sherman et al., *Affective Perseverance: Cognitions Change but Preferences Stay the Same* (paper presented at the annual meeting of the American Psychological Society, 1998); Paul Slovic, *Rational Actors and Rational Fools: The Influence of Affect on Judgment and Decision-Making*, 6 ROGER WILLIAMS U. L. REV. 163 (2000) (discussing the perseverance of induced preferences).

²¹⁹ See Cialdini et al., *supra* note 91, at 1015 (describing the influence of observed behavior in inducing like behavior).

²²⁰ See Slovic, *supra* note 218, at 172 (discussing studies demonstrating the role of affect in the formation of preference); see also Sherman et al., *supra* note 218; Robert B. Zajonc, *Feeling and Thinking: Closing the Debate over the Independence of Affect*, in FEELING AND THINKING: THE ROLE OF AFFECT IN SOCIAL COGNITION 31, 49–50 (Joseph P. Forgas ed., 2000) (suggesting that priming is almost entirely an affective process).

²²¹ See Fischhoff et al., *supra* note 28.

²²² Slovic, *supra* note 8, at 283. See generally Kasperson et al., *supra* note 1.

impact of the accident was monumental.²²³ Widespread public fear and outrage occurred following the incident, resulting in serious consequences for the utility plant, involved regulations, and increased regulations on the nuclear energy industry.²²⁴ The public viewed TMI as signaling the disaster and danger potential of nuclear reactor, and the accident primed a large segment of the population to react with fear and distrust to nuclear energy.²²⁵

Large-scale alarm following an event like TMI makes perfect sense if one thinks about the public reaction as part of a learning process: once the public understood that an accident like TMI was possible, individuals were understandably fearful of the potential for future disasters at nuclear reactor plants. The reaction to hazardous discoveries and events, however, can be complex. As Slovic points out:

An accident that takes many lives may produce relatively little social disturbance . . . if it occurs as part of a familiar and well-understood system (such as a train wreck). However, a small accident in an unfamiliar system (or one perceived as poorly understood), such as a nuclear reactor or a recombinant DNA laboratory, may have immense social consequences if it is perceived as a harbinger of further and possibly catastrophic mishaps.²²⁶

Undoubtedly, certain characteristics of the risk help to determine its signal potential. In the case of TMI, the involuntariness, unfamiliarity, and potential for catastrophe created the perfect storm. Such features of the risk (discussed in detail below) are important not only for initial perceptions of an incident but also to determine whether an incident will prime or signal the population, creating lasting attitudes about certain classes of activities.

²²³ The Washington Post has described the accident and the aftermath. See Mark Stencel, *20 Years Later: A Nuclear Nightmare in Pennsylvania*, WASH. POST, Mar. 27, 1999, <http://www.washingtonpost.com/wp-srv/national/longterm/tmi/tmi.htm> (“Before the 1979 accident at Pennsylvania’s Three Mile Island, few had heard of the nuclear power plant on the Susquehanna River.”).

²²⁴ Slovic, *supra* note 8, at 283–84.

²²⁵ *Id.* This growing skepticism and anxiety over nuclear power altered the future of the industry in the United States. “A federal investigation, assigning blame to human, mechanical, and design errors, recommended changes in reactor licensing and personnel training, as well as in the structure and function of the Nuclear Regulatory Commission. The accident also increased public concern over the dangers of nuclear power . . .” The Columbia Encyclopedia, *Three Mile Island*, ENCYCLOPEDIA.COM <http://www.encyclopedia.com/doc/1E1-ThreeMil.html> (last visited Sept. 30, 2011).

²²⁶ Slovic, *supra* note 8, at 284.

B. Features of the Risk

Three Mile Island is a classic example of how certain features of a circumstance can signal danger to the public. Another example is the fear of terrorism following September 11, 2001 (9/11). Although TMI and the attacks of 9/11 were different in many respects, with respect to priming fear, TMI and 9/11 shared some important features. They were both sudden and unexpected. They were both accompanied by vivid descriptions of destruction.²²⁷ The risks from terrorism and from the meltdown of a nuclear reactor are risks that are beyond the control of the average U.S. citizen. These examples are stunning illustrations of how powerful certain risk characteristics can be in shaping public perceptions. As central as these features of the risk situation were in explaining widespread fear, these characteristics are *not* important considerations for traditional risk management decisions, which tend to focus on quantitative assessments of likelihood and consequences.

The psychometric approach has been most instrumental in identifying features of an activity most likely to cause concern.²²⁸ Empirical work using survey materials has asked respondents to rank or rate activities for their riskiness and has then asked respondents to judge the activities along various dimensions. Results typically consist of perceptions of riskiness of a variety of activities and corresponding characterizations of each of the activities.²²⁹ For example, one of the most important early psychometric studies on risk perception asked respondents to evaluate thirty activities and technologies with respect to the perceived benefit to society, the perceived risk, the acceptability of the current level of risk, and the risk's position on each of nine dimensions of risk.²³⁰ Later surveys expanded the survey to add dimensions and revised the methodology.

²²⁷ It is important to note that the TMI imagery was communicated through descriptions of “nuclear meltdown,” “raining radioactive material,” and “the explosion of a hydrogen bubble.” The vivid images were never, fortunately, witnessed. In contrast, the images of death and destruction from 9/11 were real, devastating, witnessed by millions, and still widely available in digital photo and video archives. See, e.g., *Attack Images & Graphics*, SEPTEMBER11NEWS.COM, www.september11news.com/AttackImages.htm (last visited Sept. 30, 2011); James Nachtwey, *Sept. 11, 2001: Photographs from the Archive of Time Photographer James Nachtwey*, TIME.COM, <http://www.time.com/time/photogallery/0,29307,1660644,00.html> (last visited Sept. 30, 2011).

²²⁸ Empirical work on risk characteristics is referred to, collectively, as the psychometric study of risk perception. See *supra* Part I.

²²⁹ See Slovic, *supra* note 8.

²³⁰ See Fischhoff et al., *supra* note 28, at 127.

Psychometric survey data has revealed some interesting patterns about the risks about which people are particularly concerned and the characteristics that trigger special consideration in risk perception. Respondents tend to evaluate a risk based upon factors such as how well the risk is understood, how controllable the risk is, and the type of emotion the harm triggers.²³¹ Specifically, the early work of Fischhoff and colleagues found that “people are influenced by whether a risk is potentially catastrophic, faced by future generations, involuntarily incurred, uncontrollable, delayed rather than immediate, and particularly dreaded.”²³² Paul Slovic, another pioneer in the psychometric method, has similarly noted that “perception of risk is greater for hazards whose adverse effects are uncontrollable, dread, catastrophic, fatal rather than injurious, not offset by compensating benefits, and delayed in time so the risks are borne by future generations.”²³³ Slovic and his colleagues have grouped risk features into two broader categories: the dread risk factor and the unknown risk factor.²³⁴ The dread risk factor includes the degree to which respondents experience feelings of dread or calm in response to the risk, the perceived voluntary or involuntary assumption of the risk, the extent to which the risk is controllable or uncontrollable, and whether or not they judge the risk to have catastrophic effects.²³⁵ The dread factor is directly related to the role of affect in risk perception, which this Article discusses in detail below. The unknown risk factor includes characteristics, such as whether the risk is familiar or unfamiliar to the target, known or unknown to science, and novel or old.²³⁶ Several of these key characteristics of risks merit a more detailed discussion.²³⁷

²³¹ See Slovic, *supra* note 8, at 281–83.

²³² See Sunstein, *supra* note 179, at 521.

²³³ Paul Slovic, *Informing and Educating the Public About Risk*, in SLOVIC, *supra* note 4, at 190.

²³⁴ Slovic’s work, in particular, identified two main cognitive factors that dominate individuals’ perception of risk. See generally *id.*

²³⁵ Slovic, *supra* note 37, at 66 (“[T]he public has a broad conception of risk, qualitative and complex, that incorporates considerations such as uncertainty, dread, catastrophic potential, controllability, equity, risk to future generations, and so forth, into the risk equation.”).

²³⁶ See Slovic, *supra* note 8, at 281–83.

²³⁷ The 1978 Fischhoff study asked respondents to rate risks according to the following criteria: (1) voluntariness of risk, (2) immediacy of effect, (3) knowledge about risk by the targets, (4) knowledge about risk to science, (5) control over risk, (6) newness of risk, (7) chronic versus catastrophic, (8) common versus dreaded (“Is this a risk that people have learned to live with and can think about reasonably calmly, or is it one that people have

1. Controllability

The feeling of control is an important influence on human behavior.²³⁸ When individuals perceive that they have control over events, they experience less fear.²³⁹ Conversely, individuals are likely to view risks over which they perceive that they have little influence as more dangerous and less acceptable.²⁴⁰ Examples of uncontrollable hazards include airplane crashes, dangers from electric power, and harms from transport of hazardous materials.²⁴¹ As Neal Feigenson notes, “Motor vehicle accidents . . . are much less dreaded because people think they can control their vulnerability (‘It won’t happen to me because I drive more safely than most people’).”²⁴² In sum, “perceived lack of control is a key factor behind high risk perception.”²⁴³

The control issue becomes important in particular contexts.²⁴⁴ Individuals tend to see environment and technology risks as not under their control. They view these types of hazards as primarily the responsibility of the government.²⁴⁵ They judge lifestyle risks, on the other hand, to be a matter of personal responsibility.²⁴⁶ Risk perception can also vary, depending upon who participates in a survey. Certain subgroups within a population seem to be less risk averse, a fact that may be related to the fact that these same groups have a greater measure of power and control in society generally.²⁴⁷

great dread for—on the level of a gut reaction?”), and (9) severity of consequences (“[H]ow likely is it that the consequence will be fatal?”). Fischhoff et al., *supra* note 28, at 131.

²³⁸ See George Loewenstein, *Out of Control: Visceral Influences on Behavior*, 65 ORGANIZATIONAL BEHAV. & HUM. DECISION PROCESSES 272, 274 (1996).

²³⁹ Slovic, *supra* note 8, at 283 (noting that “expressed preference studies have shown that other (perceived) characteristics such as familiarity, control . . . and level of knowledge also seem to influence the relation between perceived risk, perceived benefit, and risk acceptance”).

²⁴⁰ *Id.* at 282 fig.1 (providing examples of psychometric data).

²⁴¹ See Loewenstein, *supra* note 238.

²⁴² Neal R. Feigenson, *Emotions, Risk Perceptions and Blaming in 9/11 Cases*, 68 BROOK. L. REV. 959, 979 (2003).

²⁴³ Paul Slovic, *What’s Fear Got to Do with It? It’s Affect We Need to Worry About*, 69 MO. L. REV. 971, 988 (2004).

²⁴⁴ Lennart Sjöberg, *The Different Dynamics of Personal and General Risk*, 5 RISK MGMT. 19, 27 (2003).

²⁴⁵ *Id.*

²⁴⁶ *Id.* at 31.

²⁴⁷ White males are less risk averse than nonwhite men and women. Slovic, *supra* note 37, at 76 (“Perhaps white males see less risk in the world because they create, manage, control, and benefit from many of the major technologies and activities.”).

2. Familiarity

The public is less concerned about risks that are familiar (such as household accidents) than they are about risks that are unfamiliar (such as nuclear waste).²⁴⁸ This fact illustrates the principle that familiarity with a given risk mediates public fear and judgments about the appropriate public response to the hazard.²⁴⁹ The unknown-risk factor includes characteristics such as known–unknown to the individual, known–unknown to science, and new–old.²⁵⁰ Familiarity has been linked to affective components of risk perception, such as dread—or more informally—fear and anxiety.²⁵¹ The familiarity effect is likely related to illusion of control, a cognitive bias that leads individuals to perceive that they have more control over their own fates and external events than they really do.²⁵² When potential harms are familiar, people have the sense that knowledge of the factors leading to the harm and the effects of the harm, better position them to prevent the harm.²⁵³ There is clearly something to this sentiment. When people understand risk factors, they are better able to educate themselves about prevention and are better prepared to prevent the harm. Of course, in order to avoid the dangers, knowledge must lead to effective action. Regardless, human beings prefer to suffer ailments that are known than those whose course and outcomes are unpredictable.²⁵⁴

Importantly, familiarity can have contradictory effects, at times increasing perceptions of the likelihood of risk. When a danger is cognitively available, people will be more likely to be able to bring instances to mind and therefore will judge the danger to be common or likely to occur in the future.²⁵⁵ This is called the availability

²⁴⁸ Frank Baker, *Risk Communication About Environmental Hazards*, 11 J. PUB. HEALTH POL'Y 341, 346 (1990).

²⁴⁹ Kasperson et al., *supra* note 1, at 178.

²⁵⁰ Slovic, *supra* note 8, at 281.

²⁵¹ Baker, *supra* note 248, at 346, 352 (noting circumstances and relationships between risks that are familiar and dreaded in regard to public preference).

²⁵² Slovic, *supra* note 8.

²⁵³ See Paul Slovic et al., *Affect, Risk, and Decision Making*, 24 HEALTH PSYCHOL. S35, S36 (2005) (“While people may be able to ‘do the right thing’ without analysis (e.g., dodge a falling object) it is unlikely that they can use analytic thinking rationally without guidance from affect . . . [which] is essential to rational action.”).

²⁵⁴ Slovic, *supra* note 8, at 283 fig.2 (demonstrating that generally people desire more regulation and protection from unknown risks as opposed to known risks).

²⁵⁵ See generally Tversky & Kahneman, *Judgment*, *supra* note 85 (discussing the availability heuristic, among other heuristics and biases).

heuristic, and was discussed in Part II.F.1. Therefore, an unfamiliar threat, particularly if it is connected with a new, complex technology that is not well understood, may create more anxiety than a more common threat, the parameters of which are relatively well known.²⁵⁶ However, very common and familiar dangers are often associated with more recent or frequent examples, heightening perception of associated harms.²⁵⁷ Ultimately, members of the public are least fearful of harms that are sufficiently familiar so as not to trigger a special fear associated with ambiguous and potentially disastrous outcomes, but not so familiar so as to be featured repeatedly in the media or in public discourse. Harms such as diabetes, asthma, and obesity have been cited as examples of dangers that exact a toll in terms of human health and morbidity far greater than that which would be suggested by the public's professed concern.²⁵⁸

3. *Voluntariness*

People are particularly frightened by risks that are involuntary.²⁵⁹ The extent to which risks associated with an activity are voluntarily assumed was one of the earliest hypothesized influences on risk judgments.²⁶⁰ Early psychometric investigations reinforced the idea that voluntarily assumed risks are more palatable to the public and judged to be less problematic than nonvoluntary hazards by a large margin.²⁶¹ The voluntariness quality is related to the issue of control

²⁵⁶ See Fischhoff et al., *supra* note 28, at 129 fig.1, 134 fig.2 (showing that the most feared risks included the unknown and new technology (e.g., nuclear power, nuclear weapons, nerve gas, and DNA research)).

²⁵⁷ For instance, one study involved showing individuals a list of well-known men and women, and whether male or female names appeared more frequently. Respondents' judgments regarding frequency were directly influenced by the relative fame individuals associated with the names. When shown lists featuring well-known men but not well-known women, respondents believed that men's names appeared more frequently. However, when presented with lists in which the women were the more famous, people judged women's names to appear more often.

²⁵⁸ Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. PA. L. REV. 1003, 1016 (2003) (noting the relative lack of concern among Americans over health risks stemming from obesity); see also Sarah Lichtenstein et al., *Judged Frequency of Lethal Events*, 4 J. EXPERIMENTAL PSYCHOL.: HUMAN LEARNING & MEMORY 551, 552 (1978) (noting that certain causes of death (accidents, homicides, tornadoes, fires, and cancer) were relatively overestimated, while others (stroke, diabetes, tuberculosis, asthma) were underestimated).

²⁵⁹ See Slovic et al., *supra* note 130.

²⁶⁰ Chauncey Starr posited that the public accepts a risk that is 1000 times greater when the risk is voluntarily assumed versus when the danger is imposed upon individuals. Starr, *supra* note 46, at 1237.

²⁶¹ See Fischhoff et al., *supra* note 28, at 143 tbl.3.

and reinforces the notion that when members of the public perceive that they have control over exposure to potential harms, they are less fearful.²⁶² The prevalence of the voluntariness characteristic of risk in risk perception scholarship points to its robust influence on the public's normative judgments about harms.²⁶³

Certain theoretical perspectives place particular emphasis on this characteristic. One example is the revealed-preferences theory, which advocates an historical examination of the use of certain technologies to gauge the acceptability of certain risks and risk characteristics.²⁶⁴ According to Chauncey Starr's research, individuals appear willing to accept risks posed by voluntary activities (e.g., skiing, driving a car, traveling by commercial jet) about one thousand times greater than they would tolerate from involuntary sources (e.g., food preservatives, nuclear energy, natural disasters) that provide the same level of benefit.²⁶⁵ Slovic and his colleagues, using a nonhistorical survey methodology, found that respondents preferred somewhat higher risk levels for voluntary, as opposed to involuntary, activities.²⁶⁶ Although Starr's initial estimates of preference for voluntary risks appear high (a survey of studies has revealed that voluntary risks are preferred by a factor of one hundred to one thousand), choice in exposure to risk remains an important factor in risk analysis.²⁶⁷

4. Catastrophic Potential

Whether the risk carries with it the potential for catastrophe is another important consideration.²⁶⁸ A definition of catastrophic is the potential "to affect many people at the same time."²⁶⁹ Research has revealed that respondents are less tolerant of risks carrying the potential for catastrophe than traditional risk analysis or "rational theory" would predict. Specifically, individuals would prefer a

²⁶² Slovic, *supra* note 8, at 283 ("[H]azards judged to be 'voluntary' tend also to be judged as 'controllable.'").

²⁶³ Kasperson et al., *supra* note 1, at 178; *see also* Fischhoff et al., *supra* note 28.

²⁶⁴ Starr, *supra* note 46, at 1235 ("Several major features of the benefit-risk relations are apparent, the most obvious being the difference by several orders of magnitude in society's willingness to accept 'voluntary' and 'involuntary' risk. As one would expect, we are loathe to let others do unto us what we happily do to ourselves.").

²⁶⁵ *Id.* at 1237-38.

²⁶⁶ *Id.* at 1235.

²⁶⁷ D. Litai et al., *The Public Perception of Risk*, in *THE ANALYSIS OF ACTUAL VERSUS PERCEIVED RISKS* 213, 219 (Vincent T. Covello et al. eds., 1981).

²⁶⁸ Kasperson et al., *supra* note 1, at 178.

²⁶⁹ Sunstein, *supra* note 179, at 506.

certain loss of a relatively small number of lives over a period of years than a small risk of a large number of lives at a single point in time.²⁷⁰ The public reportedly perceives risks with catastrophic potential as up to fifty times more risky than noncatastrophic risks. Moreover, surveys have revealed that the public prefers voluntary risks by a factor of one hundred to one thousand.²⁷¹ This may also be related to the issue of perceived control and status quo.²⁷² The “natural” state of affairs is more similar to a small loss of a number of lives over an extended period of time. Human beings suffer various ailments that compromise health and shorten lives due to familiar causes like heart disease, cancer, liver disease, diabetes, respiratory disease, and accidents. Although death by these means is no less tragic than death by other means, members of the public are used to loss of life through these means. In contrast, catastrophic loss involving sudden loss of multiple lives strike individuals as particularly upsetting.²⁷³ Examples of such catastrophic losses include those incurred following plane crashes, explosions, and natural disasters. Because they are fairly rare, they are unfamiliar, and because they result in multiple lives lost, they induce a level of fear that is out of proportion with the level of fear that would be predicted by standard rational choice theory.²⁷⁴ Risks assumed on an individual level, such as those posed by cigarette smoking, alcohol consumption, and driving a motor vehicle are less fear inducing, in part, because the consequences of these risks are rarely catastrophic.²⁷⁵

Another characteristic of risk related to catastrophic potential is the reversibility of associated harms. Not surprisingly, individuals are more concerned about risks they perceive to have long-term and potentially irreversible effects.²⁷⁶ The qualities of being catastrophic

²⁷⁰ This tendency is irrational because it means that under certain circumstances, people will choose an option that results in a greater statistical loss of life. This expressed preference is at odds with our general understanding of attitudes about risk *and* traditional risk theory.

²⁷¹ Litai et al., *supra* note at 267.

²⁷² See Slovic, *supra* note 8.

²⁷³ *Disasters*, INFOPLEASE (2007), <http://www.infoplease.com/ipa/A0001437.html> (last visited Sept. 30, 2011) (listing disasters by year, including the highly publicized 2010 oil spill).

²⁷⁴ See *supra* Part II.

²⁷⁵ Torbjørn Rundmo, *Associations Between Affect and Risk Perception*, 5 J. RISK RES. 119, 134 (2002).

²⁷⁶ Fischhoff & Fischhoff, *supra* note 200.

and being irreversible have been an indication for the need to take extra precautions for countries and governments no less than individuals.²⁷⁷ The 1992 Rio Declaration on Environment and Development asserts, “In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”²⁷⁸ Calls to replace traditional risk analysis have integrated these concerns over the potential for an increasing pace of technological ingenuity to outpace careful investigation and understanding of potential effects having irreversible consequences, with implications for current and future generations.²⁷⁹

5. Equity

Less ubiquitous, but still present in the psychometric literature, is the concern citizens have regarding the potential for inequitable distribution of risks. Particularly prevalent is the worry that historically disadvantaged members of the population are disproportionately exposed to harm. The unequal exposure to risk of a particular identifiable population may trigger outrage and indignation, depending upon the history and perceived vulnerability of the group.²⁸⁰ Beck draws a connection between the modern

²⁷⁷ Cass R. Sunstein, *Irreversible and Catastrophic*, 91 CORNELL L. REV. 841, 841 (2006) (“When a harm is irreversible, and when regulators lack information about its magnitude and likelihood, they should purchase an “option” to prevent the harm at a later date—the Irreversible Harm Precautionary Principle. This principle brings standard option theory to bear on environmental law and risk regulation. And when catastrophic outcomes are possible, it makes sense to take special precautions against the worst-case scenarios—the Catastrophic Harm Precautionary Principle.”).

²⁷⁸ United Nations Conference on Environment and Development, Rio de Janeiro, Braz., June 3–14, 1992, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/26/Rev.1 (Vol. I), Princ. 15 (Aug. 12, 1992).

²⁷⁹ See Bruna De Marchi, *Public Participation in Risk Governance*, 30 SCI. & PUB. POL’Y 171, 174 (2003) (“To this end, progress is necessary in constructing new methods of decision-making, which include not only revised structures, but also innovative modes of thinking, communicating, and interacting. In this context, risk governance is to be conceived in more inclusive terms than the usual dichotomy risk assessment/risk management. As past experience has shown, catastrophic and often irreversible effects of (old and new) technologies might be anticipated.” (internal footnote omitted)).

²⁸⁰ Examples of perceived inequity can often be found by examining various media outlets. See, e.g., *Rapper Kanye West Denounces Bush Response, American Media at Hurricane Relief Telethon*, WIKINEWS, Sept. 3, 2005, http://en.wikinews.org/wiki/Rapper_Kanye_West_denounces_Bush_response,_American_media_at_hurricane_relief_telethon (showing an African American man accusing the president of not caring about black

allocation of risk and outcome with “legitimate” methods of wealth distribution.²⁸¹ Risks, like resources, profoundly affect quality of life, and, like resources, risks are virtually never uniformly distributed across all segments of society.²⁸² Dangers threaten the lives, health, and property of members of society, but they may also jeopardize psychological security, freedoms, and interpersonal relationships.²⁸³ Nowhere is this more relevant than in situations in which members of society are systematically and disproportionately subjected to particular types of risks.²⁸⁴ A prominent example is the environmental justice movement in which a rising tide of concern and unrest has led to efforts to reshape environmental policy.²⁸⁵

Publications written for risk management professionals or for governmental agencies commonly caution against ignoring potentially discriminatory practices and selective protection. The Environmental Protection Agency, for example, has published material suggesting that much of the debate over environmental degradation has related to questions of who has power to affect decisions and how this might implicate issues of fairness and equality. This work provides specific advice based on the work of various risk perception experts.²⁸⁶ The Environmental Protection Agency has endorsed the systematic examination of potentially unequal exposure to pollutants across various disadvantaged communities.²⁸⁷ Widespread concern over inequalities in environmental protections has led to organizing efforts

people in the wake of Hurricane Katrina); *Race an Issue in Katrina Response*, CBS NEWS, Feb. 11, 2009, <http://www.cbsnews.com/stories/2005/09/03/katrina/main814623.shtml> (detailing issues with race and Hurricane Katrina).

²⁸¹ BECK, *supra* note 9, at 19.

²⁸² *Id.* at 41 (“There is a systematic ‘attraction’ between extreme poverty and extreme risk.”).

²⁸³ See Kasperson & Kasperson, *supra* note 18, at 96 (discussing the potential impacts on human well-being and social structures posed by risks).

²⁸⁴ See BECK, *supra* note 9, at 23 (discussing “social risk positions”).

²⁸⁵ See generally Dorceta E. Taylor, *The Rise of the Environmental Justice Paradigm: Injustice Framing and the Social Construction of Environmental Discourses*, 43 AM. BEHAV. SCIENTIST 508 (2000) (detailing the ways in which the community-based environmental justice movement has influenced environmental research and policy).

²⁸⁶ See PETER M. SANDMAN, *EXPLAINING ENVIRONMENTAL RISK* (1986); see also BARRY L. JOHNSON, *IMPACT OF HAZARDOUS WASTE ON HUMAN HEALTH: HAZARD, HEALTH EFFECTS, EQUITY, AND COMMUNICATIONS ISSUES* 33 (1999).

²⁸⁷ See, e.g., U.S. ENVTL. PROT. AGENCY, *ENVIRONMENTAL EQUITY: REDUCING RISK FOR ALL COMMUNITIES* 31–36 (1992);

in order to heighten awareness and advance more progressive policies and practices.²⁸⁸

C. Cultural and Personal Identity Factors

Cultural approaches to risk perception and assessment have had two general foci. The first is the role that the individual's worldview takes in his or her experience of risk.²⁸⁹ The second is the role of emotion (or affect) on risk perception.²⁹⁰ The idea that culture-based studies identify individual differences that might influence risk perception may seem incongruous given that the study of culture is usually a study of socially cultivated understandings common to a group of people.²⁹¹ However, the importance of an individual's worldview is a common emphasis in the cultural definition of risk response so that individual variations in worldviews assume relevance for purposes of risk evaluations.²⁹² Emotional reactions to dangers, although they are sometimes treated as exogenous to cultural worldview, are actually manifestations of those views or preferences.²⁹³ The new methodology this Article proposes first considers emotional reactions to danger and then looks at worldview to evaluate risk perception.

²⁸⁸ One example was the First National People of Color Environmental Leadership Summit in Washington, D.C., in 1991. For this and other examples, see SECOND NATIONAL PEOPLE OF COLOR ENVIRONMENTAL LEADERSHIP SUMMIT, ENVIRONMENTAL JUSTICE TIMELINE—MILESTONES (2002), available at <http://www.ejrc.cau.edu/summit2/%20EJTimeline.pdf>. See also Vicki Been, *What's Fairness Got to Do with It: Environmental Justice and the Siting of Locally Undesirable Land Uses*, 78 CORNELL L. REV. 1001 (1993); Robert D. Bullard & Beverly Hendrix Wright, *The Politics of Pollution: Implications for the Black Community*, 47 PHYLON 71, 78 (1986).

²⁸⁹ See Kahan et al., *supra* note 130, at 1072 (“A growing body of work suggests that cultural worldviews permeate all of the mechanisms through which individuals apprehend risk, including their emotional appraisals of putatively dangerous activities, their comprehension and retention of empirical information, and their disposition to trust competing sources of risk information.”).

²⁹⁰ Although the terms “emotion” and “affect” have received disparate treatment, particularly in the psychological literature, this Article refers to them interchangeably. There is some precedent for using these terms in this fashion. See James M. Jasper, *The Emotions of Protest: Affective and Reactive Emotions In and Around Social Movements*, 13 SOC. F. 397, 405 (1998) (discussing types of emotion as a subset of, but not a synonym for, “affect”); see also Susan A. Bandes, *Response, Emotions, Values, and the Construction of Risk*, 156 U. PA. L. REV. PENNUMBRA 421, 424 n.13 (2008) (“The terms ‘emotion’ and ‘affect’ are sometimes used interchangeably and sometimes to connote different concepts. Neither has a single accepted meaning.”).

²⁹¹ See *supra* Part I.

²⁹² Kahan et al., *supra* note 130, at 1072.

²⁹³ *Id.*

1. *Emotions*

A significant debate has centered on the question of whether emotions play an adaptive or maladaptive role in risk evaluation.²⁹⁴ There are two fundamental ways in which human beings comprehend risk: the analytic system and the experiential system. One relies upon effortful calculations, algorithms, rules of logic, and calculating risk probabilities in solving problems and formulating choices.²⁹⁵ This system is “relatively slow, effortful, and requires conscious control.”²⁹⁶ The experiential system relies on intuition and is “fast, mostly automatic, and not very accessible to conscious awareness.”²⁹⁷ The experiential system relies upon a combination of what we might call “instinct” and learned behaviors. Most choices made by human beings are formulated using this system. Affective reactions to various situations provide information about whether that situation, and features of that situation, should be avoided. Positive emotions like feelings of calm, safety, and familiarity lead to one set of decision outcomes, while negative emotions such as dread, uncertainty, and fear lead to a different set of choices.²⁹⁸

Proponents of formal risk analysis tend to view affective responses to risk as across-the-board irrational. Current wisdom disputes this view. The rational, or analytic, system and the experiential, or affect-based, system are complementary; each depends upon the other for guidance.²⁹⁹ Studies have demonstrated that analytic reasoning cannot be effective unless emotion and affect guide it.³⁰⁰ According to Slovic,

[V]arious studies demonstrate that affect is a strong conditioner of preference, whether or not the cause of that affect is consciously perceived. They also demonstrate the independence of affect from cognition, indicating that there may be conditions of affective or emotional arousal that do not necessarily require cognitive

²⁹⁴ *Id.* at 1073–74.

²⁹⁵ See generally Paul Slovic et al., *Risk as Analysis and Risk as Feelings: Some Thoughts About Affect, Reason, Risk, and Rationality*, 24 RISK ANALYSIS 311 (2004).

²⁹⁶ *Id.*

²⁹⁷ *Id.*

²⁹⁸ *Id.*; see also MARTHA C. NUSSBAUM, UPHEAVALS OF THOUGHT: THE INTELLIGENCE OF EMOTIONS 19, 20 (2001); George F. Loewenstein et al., *Risk as Feelings*, 127 PSYCHOL. BULL. 267, 267 (2001) (offering “an alternative theoretical perspective, the risk-as-feelings hypothesis, that highlights the role of affect experienced at the moment of decision making”).

²⁹⁹ Slovic et al., *supra* note 295.

³⁰⁰ *Id.*

appraisal. This affective mode of response, unburdened by cognition and hence much faster, has considerable adaptive value.³⁰¹

Judgments of potential sources of harms are highly correlated with emotional valence, as measured by respondent ratings on scales such as *good/bad*, *nice/awful*, and *dread/not dread*.³⁰² These empirical results suggest the importance not only of analytic evaluations of an activity or a technology but also of affective reactions to that activity. While some have argued that emotions are simply a byproduct of reason-based decisions about risk,³⁰³ findings largely refute this possibility, suggesting that emotional reactions come first and that effortful reasoning processes supplement or justify initial affective reactions.³⁰⁴ Moreover, emotion-based evaluations can lead to optimal decision making. Findings from psychological studies on choice formation suggest that decision makers often optimize outcomes when they stick with initial “gut” judgments.³⁰⁵ Analyzing costs and benefits of various courses of action can lead to decisions that people later regret, and those that are inconsistent with later behavior and preferences.³⁰⁶

Even if emotions do not consistently serve as optimal cues for risk-decision purposes, they may serve as signals for personal beliefs that have enormous value to the human being who holds them.³⁰⁷ The value of affective reactions is explicit in the cultural evaluator model advanced by Dan Kahan, discussed in Part II.E of this Article. The cultural evaluator model of risk perception views emotional responses to risk as reflective of an individual’s culturally defined, expressive

³⁰¹ Slovic, *supra* note 218, at 172.

³⁰² Early psychometric studies of risk perception showed that feelings of dread were the major determinant of public perception and acceptance of risk for a wide range of hazards. See Fischhoff et al., *supra* note 28; Slovic, *supra* note 8.

³⁰³ See Kahan, *supra* note 26, at 746.

³⁰⁴ See Slovic, *supra* note 218, at 172.

³⁰⁵ See TIMOTHY D. WILSON, STRANGERS TO OURSELVES: DISCOVERING THE ADAPTIVE UNCONSCIOUS 170 (2002).

³⁰⁶ *Id.* The fact that affective responses have a useful function in risk response does not mean that emotions never prevent optimal decision making. Unquestionably, emotions can prevent consideration of all relevant factors in a decision-making situation or can cause individuals to rush to judgment. Moreover, because emotions are so prevalent in risk decisions, people are especially vulnerable to manipulation by parties with vested interests who use emotional appeals or fear tactics to motivate future judgments.

³⁰⁷ See NUSSBAUM, *supra* note 298 (“Emotions . . . involve judgments about important things . . . in which, appraising an external object as salient for our own well-being, we acknowledge our own neediness and incompleteness before parts of the world that we do not fully control.”).

evaluation of potential dangers.³⁰⁸ According to Kahan, “When people draw on their emotions to judge the risk that such an activity poses, they form an expressively rational attitude about what it would *mean* for their cultural worldviews for society to credit the claim that that activity is dangerous and worthy of regulation”³⁰⁹ The cultural evaluator model rejects both the neoclassical-economic-rational-actor model (which claims that risk decisions involve analytical optimization strategies) and the behavioral-decision-theory model (which views emotions as biases).³¹⁰

Instead of taking a pessimistic view of affect, cultural evaluator theory views emotion as signaling underlying values, which themselves have worth.³¹¹ In sum, “emotional responses to risk can be understood as tools, guiding the individual toward decisions that serve deeply held values and preferences It is not, after all, irrational for members of society to care about meanings and not just about consequences and to form positions on risk that express their cultural values.”³¹² As Kahan points out, “individuals’ decisions to forgo or forbear risks is based not on the expected utility of those actions but on their social meanings, which are unlikely to be tied in any systematic way to the actuarial magnitude of those risks.”³¹³ Emotions are highly dependent upon other features of the risk context.³¹⁴ When there is a known, hated perpetrator or when there is an act that is outrageous, there will be more agitation, perhaps not out of *fear per se*, but out of a hybrid of fear and loathing for the source of the fear.³¹⁵ A recent example from American history is Osama bin Laden.³¹⁶

2. Cultural Worldviews

There are two ways of categorizing characteristics of the risk perceiver in terms of worldview. The first is based upon demographic

³⁰⁸ See generally Kahan, *supra* note 26.

³⁰⁹ *Id.* at 750–51.

³¹⁰ See *id.* at 749 (noting that the cultural evaluator theory offers a much different account of how emotions enter the cognition of risk than the irrational weigher theory).

³¹¹ See *id.* at 748–49.

³¹² Wilson, *supra* note 123, at 1307; accord Kahan, *supra* note 26, at 758.

³¹³ Kahan, *supra* note 26, at 754.

³¹⁴ *Id.* at 741.

³¹⁵ *Id.* at 746.

³¹⁶ See Deborah A. Small & George Loewenstein, *The Devil You Know: The Effects of Identifiability on Punishment*, 18 J. BEHAV. DECISION MAKING 311, 313 (2005) (discussing the common urge to exact revenge upon identifiable wrongdoers).

information.³¹⁷ The second involves what cultural-risk scholars call cultural-worldview typology.³¹⁸ Proponents of this typology believe that a person's moral or philosophical approach to the world guides that person's risk preferences.³¹⁹ By defining people as high or low on control (grid) and social commitment (group), the cultural worldview typology makes certain predictions about how individuals will form judgments about a wide range of potential dangers.³²⁰

Members of society who have hierarchic orientations tend to accept risks, provided that government authorities or other authoritarian experts legitimate the risk; they are, however, deeply distrustful of risks that threaten the social order.³²¹ Egalitarians, on the other hand, reject risks imposed by a small group on a large group, particularly when those in authority impose them and when they will affect future generations.³²² Fatalists have low sympathy for group attachment but a strong orientation toward socially assigned classifications, and individualists tend to reject social structures and group attachment.³²³ Orientation toward the group is hypothesized to have profound influences on risk perception.³²⁴ Individual worldviews might also interact with risk characteristics. For example, there is some thought that personality variables influence an individual's degree of concern over the potential for catastrophic outcomes generally.³²⁵

³¹⁷ See MARY DOUGLAS, *NATURAL SYMBOLS* 54–68 (1970).

³¹⁸ See *id.*

³¹⁹ See *id.*

³²⁰ See DOUGLAS & WILDAVSKY, *supra* note 2, at 138–39; see also Susanne Rippl, *Cultural Theory and Risk Perception: A Proposal for a Better Measurement*, 5 J. RISK RES. 147, 149 (2002).

³²¹ See generally DOUGLAS & WILDAVSKY, *supra* note 2.

³²² See *id.* at 126 (“[T]hose organized on voluntaristic, egalitarian principles will make the sectarian selection of risks and justify their view of danger.”).

³²³ *Id.* at 99, 101; see also Rippl, *supra* note 320.

³²⁴ See Steve Rayner, *Cultural Theory and Risk Analysis*, in *SOCIAL THEORIES OF RISK* 83, 87 (Sheldon Krinsky & Dominic Golding eds., 1992).

³²⁵ See Marris et al., *supra* note 5, at 640 (“Egalitarians, for example, are predicted to be more concerned about large-scale environmental risks with potentially catastrophic consequences such as nuclear power and ozone depletion, whereas individualists would consider these risks to have been exaggerated, and hierarchists should be most concerned about social issues such as mugging and terrorism which threaten their sense of order and security.”). For more on the cultural view, see Aaron Wildavsky & Karl Dake, *Theories of Risk Perception: Who Fears What and Why?* 119 RISK 41 (1990).

3. *Self-Relevance*

One unsurprising finding is that the more relevant a particular hazard is to a certain subgroup, the more concern members of that group express about that risk. For example, research has found that age-related illnesses seem particularly threatening to respondents of advanced age.³²⁶ Certain populations within a society assign higher importance to some risks than other groups, based upon a shared vulnerability to associated risks.³²⁷ Such groups often mobilize in an attempt to gain attention and resources for the adoption of risk reduction in areas the group perceives as important for one reason or another.³²⁸ One category of risk that is particularly relevant to large segments of the population is those risks likely to be catastrophic in nature.³²⁹ The self-relevance feature may help to explain why catastrophic risks—or those risks perceived as catastrophic—are more likely to cause widespread panic.³³⁰ A lack of perceived self-relevance may also explain why some serious risks receive surprisingly little attention. An example is climate change.³³¹ Until recently, climate change received relatively little public attention. Climate change is a harm that is difficult to experience personally. No doctor will diagnose a patient with climate change and give the patient six months to live. Because natural disasters tend to be localized, people rarely connect dramatic weather events (which *do* have relevance to members of the population) with global climate change.

D. Additional Relevant Features of the Risk Context

A number of additional aspects of the risk situation are relevant in predicting which types of harms will cause individuals particular anxiety. These features do not fit easily into the aforementioned categories, and yet they are significant considerations and germane to any attempt to construct an effective risk-perception prediction model.

³²⁶ Marris et al., *supra* note 5, at 639.

³²⁷ See Sunstein, *supra* note 277, at 852.

³²⁸ Kasperson et al., *supra* note 1, at 178 (“[V]arious groups present competing evidence based upon their own perceptions and social agenda.”).

³²⁹ *Id.*

³³⁰ Sunstein, *supra* note 277, at 841; see also Kasperson et al., *supra* note 1, at 178.

³³¹ Slovic, *supra* note 8, at 282 fig.1.

1. *Benefits of Activity / Cost of Precautions*

Traditional risk analysis features the benefits associated with a potentially harmful activity as a central consideration. Later attempts to determine social acceptability also made benefits a pivotal feature of risk assessment.³³² Although experts who engage in cost-benefit analysis diverge from the public substantially with respect to some criteria for risk response, both experts and members of the public care about the benefit associated with a risk. Ultimately, the public will accept more risk for activities that are more beneficial.³³³ Conversely, if individuals perceive that they will have to make personal sacrifices in order to reduce the chance of a potential danger materializing, they may well profess less concern about the danger.³³⁴ The importance of realized benefits to the acceptability of risks may be captured at least indirectly by the measure of voluntariness.³³⁵ As Frank Cross points out, “The voluntary acceptance of risk helps ensure that the same group incurs both the risk and the benefit of an activity (otherwise the community bearing the risk is unlikely to voluntarily accept it). An involuntarily borne risk, by contrast, may compel one group to accept the risk, while others benefit.”³³⁶

2. *Concreteness or Cognitive Availability*

Behavioral researchers call the human tendency to “place more weight on concrete, emotionally interesting information than on more probative abstract data” the vividness bias.³³⁷ As previously mentioned, facilitators frequently use vivid language to evoke emotions and increase cognitive recall, making the technique of using dramatic examples and detailed descriptions common in a variety of

³³² See Starr, *supra* note 46.

³³³ Fischhoff et al., *supra* note 28, at 148–51; see also Susan G. Hadden, *Public Perception of Hazardous Waste*, 11 RISK ANALYSIS 47, 48 (1991).

³³⁴ Sunstein, *supra* note 179, at 507 (“To the extent that people understand that they are themselves contributors to climate change, they are inclined to diminish the magnitude of the threat.”).

³³⁵ See SUSAN G. HADDEN, A CITIZEN’S RIGHT TO KNOW 137 (1989) (“[Public use of risk is] a much richer concept that involves balancing benefits against unwanted outcomes and also involves some sense of the fairness of the activities that create the risk.”); see also Frank B. Cross, *The Public Role in Risk Control*, 24 ENVTL. L. 887, 926 (1994) (“An activity with substantial perceived benefits will, on balance, be considered to be less risky. Because the risk appears more worthwhile, it consequently seems less great.”).

³³⁶ Cross, *supra* note 335, at 915.

³³⁷ See RICHARD NISBETT & LEE ROSS, HUMAN INFERENCE: STRATEGIES AND SHORTCOMINGS OF SOCIAL JUDGMENT 55–61 (1980).

forums and for a range of purposes. The European Union, for example, has required cigarette packages to feature images of diseased lungs.³³⁸

Certain types of occurrences provide fertile ground for subsequent vivid accounts. Dramatic environmental events, such as natural disasters, have received the lion's share of attention, while other, arguably more harmful environmental processes have gone relatively unnoticed.³³⁹ The visual impact and subsequent mental imagery of a danger influences the cognitive availability of a risk. Some risks lend themselves to cognitive indelibility. For example, "the impact of seeing a house burning on the subjective probability of such accidents is probably greater than the impact of reading about a fire in the local paper."³⁴⁰

The vividness bias and the availability heuristic are related, in that vivid depictions of events make examples of such events more

³³⁸ See Paul Meller, *Gag Order: EU Law's Graphic Tobacco Warnings*, INT'L HERALD TRIBUNE, Mar. 1, 2001, <http://lists.essential.org/pipermail/intl-tobacco/2001q1/000426.html>. Other, similar campaigns have been launched and promulgated with substantial aid from such methods. See e.g., Danielle Bean, *Is this Pro-Life Ad too Graphic?*, NAT'L CATHOLIC REG. (Feb. 5, 2010, 9:00 AM), http://www.ncregister.com/blog/is_this_pro-life_ad_too_graphic/ (identifying a graphic campaign for anti-abortionists with strategic use of vivid pictures and language); Heather McCracken, *Graphic Ad Tackles Drink-Drivers*, NEW ZEALAND HERALD, June 21, 2009, http://www.nzherald.co.nz/road-safety/news/article.cfm?c_id=308&objectid=10579763 (using a graphic television commercial to prevent drunk driving).

³³⁹ See Kuran & Sunstein, *supra* note 23, at 707; Sunstein, *supra* note 102 (noting that cascade effects caused by the availability heuristic can produce a public demand for regulation even though the relevant risks are trivial, while producing little or no demand for regulation of risks that are large in magnitude); Cass R. Sunstein, *Endogenous Preferences*, *Environmental Law*, 22 J. LEGAL STUD. 217, 241 (1993) [hereinafter Sunstein, *Endogenous*]; Charles Yablon, *The Meaning of Probability Judgments: An Essay on the Use and Misuse of Behavioral Economics*, 2004 U. ILL. L. REV. 899, 936 ("If people are mistaken about the fatalities associated with various activities, then they are likely to favor overexpenditure of funds to prevent damage from [less dangerous hazards] while underfunding efforts to reduce [more dangerous hazards], which they view as less dangerous."); cf. Robert S. Adler, *Flawed Thinking: Addressing Decision Biases in Negotiation*, 20 OHIO ST. J. ON DISP. RESOL. 683, 701 n.56 (2005) ("In some cases, [policy makers] may be prodded to regulate insignificant risks, and in others they may face apathy in promoting public health measures.").

³⁴⁰ Tversky & Kahneman, *Judgment*, *supra* note 85. Other serious risks whose effects will occur over a long period of time and whose dangers lack vividness command less attention. Sunstein has written about climate change: "No salient event heightens public concern, and indeed most people lack personal experience that would make the relevant risks seem immediate or even real as opposed to speculative and hypothetical." Sunstein, *supra* note 179, at 507.

cognitively available.³⁴¹ Historical illustrations make the point best. As Cass Sunstein has noted, “With respect to terrorism, the attacks of 9/11 are highly salient, in a way that is likely to lead people to perceive a strong likelihood of a future attack or perhaps to neglect the question of probability altogether, focusing instead on the worst that might happen.”³⁴² In contrast, some hazards are inconspicuous, slow to develop, and subtle as their approach. An example is slow-growing cancers.³⁴³ The risk from such cancers is very serious and may be statistically more devastating than other types of risks.³⁴⁴ However, because the danger is less dramatic and the effects are hidden and less vivid, this type of harm is less easily brought to mind than other types of harms, such as tsunamis, tornados, and other dramatic weather events, plane crashes, and explosions.³⁴⁵ The latter categories of events are not only easier to retrieve, but also they involve images that are prone to slow cognitive decay.³⁴⁶

E. The Media and Risk Perception

What the media chooses to report has important implications for how members of society perceive risks.³⁴⁷ The infamous Love Canal situation has been cited as an example of the media’s powerful role in shaping public perception.³⁴⁸ Initially, alarming reports caused widespread concern, and subsequent attempts by nonmedia spokespersons and experts to revise initial estimates of harm were

³⁴¹ For more on the availability heuristic, see Kuran & Sunstein, *supra* note 23, at 685–91. See also Jolls, *supra* note 87; Jolls et al., *supra* note 84, at 1519; Korobkin & Ulen, *supra* note 87; Pidot, *supra* note 87; Sunstein, *supra* note 87.

³⁴² Sunstein, *supra* note 179, at 507.

³⁴³ Carcinoid is a slow-growing type of neuroendocrine tumor. CARCINOID CANCER FOUND., FOR PATIENTS: NEWLY DIAGNOSED: THE BASICS, <http://www.carcinoid.org/content/newly-diagnosed-basics> (last visited Sept. 30, 2011).

³⁴⁴ Sunstein, *supra* note 179, at 541.

³⁴⁵ Kuran & Sunstein, *supra* note 23, at 685–91.

³⁴⁶ See Howard Eichenbaum & Norbert Fortin, *Episodic Memory and the Hippocampus: It’s About Time*, 12 CURRENT DIRECTIONS IN PSYCHOL. SCI. 53, 53 (2003) (“Episodic memory refers to the capacity to mentally reexperience a previous occasion in one’s life. . . . [It has] a special capacity for the recollection of specific personal experiences.”).

³⁴⁷ Altheide, *supra* note 13, at 664 (arguing that the media has the power to influence public perceptions of risk).

³⁴⁸ Eric R. Pogue, *The Catastrophe Model of Risk Regulation and the Regulatory Legacy of Three Mile Island and Love Canal*, 15 PENN ST. ENVTL. L. REV. 463, 472–77 (2007) (giving a detailed description of regulation before the Love Canal incident, the incident itself, and the response to the incident).

ineffective in reassuring the public.³⁴⁹ Media players can act as risk communication facilitators in the same way that famous personalities and organized public interest groups can. Moreover, so-called availability entrepreneurs of all stripes utilize mass media outlets to spread their message.

1. *Constraints and Goals of the Media*

The news media is constrained by three factors: deadlines, resource limitations, and geographical factors.³⁵⁰ At times the realities of a developing story and a firm deadline force journalists to file a partial story that might not include all of the important details or might not even provide the most relevant details of the story, depending upon whether journalists gather the bulk of the information after a deadline.³⁵¹ Newspapers face the most difficult deadline constraints, while deadlines have less effect on radio, television, and the Internet.³⁵²

As with any industry, media outlets have specific goals. General goals for media include constructing audiences and maximizing profits.³⁵³ Like any other industry, the media seeks to make a profit³⁵⁴ by decreasing expenses and increasing revenue.³⁵⁵ Although advertising is the most effective method for increasing revenue, another strategy for increasing profit is to grow audience size by increasing the attractiveness of content.³⁵⁶ The most direct way of augmenting audience size is to adopt a marketing perspective, paying special attention to the types of stories that will generate the largest

³⁴⁹ See Kasperson et al., *supra* note 1, at 184.

³⁵⁰ See W. JAMES POTTER, *MEDIA LITERACY* 103–05 (3d ed. 2005).

³⁵¹ *Id.* (providing an example of this situation regarding morning newspapers). Journalists typically will have a deadline the night before; therefore, any information gathered after that deadline cannot be included in the next morning edition of the newspaper. The editor of the paper will then have to make the decision whether to include the information in the next day's paper. If she does so then the information is old news and the audience surely is already aware of it, but if she does not, then the paper did not report the full news.

³⁵² *Id.*

³⁵³ *Id.* at 180–86. *But see* ELIZABETH M. PERSE, *MEDIA EFFECTS AND SOCIETY* 228 (2001) (“[T]he goal of mass media should be to improve society, not merely to give people what they want.”).

³⁵⁴ DAVID CROTEAU & WILLIAM HOYNES, *THE BUSINESS OF MEDIA: CORPORATE MEDIA AND THE PUBLIC INTEREST* 107–09 (2d ed. 2006).

³⁵⁵ POTTER, *supra* note 350, at 182.

³⁵⁶ *Id.*

audiences.³⁵⁷ Often, unusual and sensational news stories draw audiences.³⁵⁸ Recent commentary has discussed the media trend toward gossip, celebrities, and sensationalistic stories.³⁵⁹ Story formulas are another influence on what the media reports.³⁶⁰ Time constraints lead reporters to resort to shortcuts, or story formulas, to generate material.³⁶¹ The reliance on these formulas can skew, or even change, the way the public perceives the story.³⁶²

2. *What the Media Reports*

The media's choice of what to report is often largely determinative of what receives public attention.³⁶³ Media outlets tend to report on risks that reporters and editors already deem to be of interest to the public.³⁶⁴ The initial determination is a key factor in determining what news reaches the public. The media tend to focus on risks that kill or injure numerous people at a single time as opposed to risks that have a cumulative effect over a longer time span, such as a year.³⁶⁵ Routine sources of danger and common risks are less newsworthy. Catastrophes and unusual risks are novel and imminently sellable.³⁶⁶ The amount of time it takes for an event to unfold, or to occur, also

³⁵⁷ *Id.* at 185.

³⁵⁸ PERSE, *supra* note 353, at 39.

³⁵⁹ KELLI S. BURNS, CELEB 2.0: HOW SOCIAL MEDIA FOSTER OUR FASCINATION WITH POPULAR CULTURE (“[C]elebrity reporting has become an accepted part of the news, with the antics of celebrities showing up in venerable mainstream media outlets . . .”); *see also* POTTER, *supra* note 350, at 107 (noting that people like deviance from the norm). Because of this, the news media are more interested in presenting stories that are deviations than those that fall within the realm of “normal,” because they are considered to be more newsworthy.

³⁶⁰ POTTER, *supra* note 350, at 110.

³⁶¹ *See id.* at 103. Judges and legal practitioners have had to develop methods for dealing with the fallout from media sound bites and skew. *See* LIEVE GIES, LAW AND THE MEDIA: THE FUTURE OF AN UNEASY RELATIONSHIP 8 (2008) (referring to the legal system’s “extraordinary institutional resilience and its ability to take on its media detractors”).

³⁶² POTTER, *supra* note 350, at 110–11. An example of a story formula is the series of questions: Who? What? Where? When? Why? and How? Another story formula is called the inverted pyramid. In this structure a journalist places the most important information at the beginning of the story and then progressively moves on to information of less importance.

³⁶³ *See* Kasperson & Kasperson, *supra* note 18, at 98.

³⁶⁴ Edward S. Herman, *The Media and Markets in the United States*, in THE RIGHT TO TELL: THE ROLE OF MASS MEDIA IN ECONOMIC DEVELOPMENT 61, 62–64 (2002).

³⁶⁵ Emma Hughes et al., *The Media and Risk*, in RISK IN SOCIAL SCIENCE 250, 253 (Peter Taylor-Gooby & Jens O. Zinn eds., 2006).

³⁶⁶ *Id.* at 255.

plays an important role in how newsworthy a story is.³⁶⁷ For example, environmental degradation, such as worsening water quality and deforestation, is less likely to make it into the news than a single environmental disaster, such as a tsunami, hurricane, or massive flooding.³⁶⁸ Another factor important to determining what information will make it into the media is whether there is a human angle to the story.³⁶⁹ Personal accounts are particularly likely to engage the audience.³⁷⁰ News stories that focus on the trials of a single person are also more likely to contain salient details, making the story easily recalled and recounted.³⁷¹

While reporters seek out compelling subject matter, story content is not the only consideration. The types of sources available also influence which stories the media reports. The media tend to favor official sources, as opposed to alternative sources, and to engage in relatively little independent investigation to substantiate information from these sources, as opposed to the investigation conducted to verify information provided by an alternative source.³⁷² When the story involves a crisis, such as a natural disaster, the media is particularly likely to favor official sources. After most of the fallout from a crisis has passed, the media tend to become more critical of the sources they have used.³⁷³ Another factor influencing which sources gain access to the media is a source's resources. Greater resources allow certain sources of information to access the media disparately. Well-heeled sources not only gain initial access to media outlets, but also they often outlast any opposition with fewer resources.³⁷⁴

³⁶⁷ *Id.* This immediacy bias is reflected not only in consumer preferences but also in legislative responses to harms. One example is involuntary civil commitment requirements for the mentally ill, which specify that prior to commitment there must be a demonstration that due to mental illness the subject is an immediate danger to self or others. *See, e.g.*, UTAH CODE ANN. § 62A-5-312(3)(a) (2011) (indicating that the subject must manifest “an *immediate* danger of physical injury to self or others” (emphasis added)); ALA. CODE § 22-52-10.4(a)(ii) (1997) (requiring proof that “respondent poses a real and present threat of substantial harm to self and/or others”); DEL. CODE ANN. tit.16 § 5001 (1996).

³⁶⁸ Hughes et al., *supra* note 365; *see also* Herman, *supra* note 364.

³⁶⁹ *See* Hughes et al., *supra* note 365, at 256.

³⁷⁰ *See id.*

³⁷¹ *See id.*

³⁷² *Id.* at 253.

³⁷³ *See id.* at 254.

³⁷⁴ *Id.* An example of this was silicone breast implants in the 1990s. At first, media coverage focused on health risks and testimonials from women who had complications. As time passed, the leading manufacturer of breast implants, Corning, was able to take advantage of its resources and public relations officials. Later coverage was then

The geological, cultural, or political focus of the reporter or media outlet also influences that which it deems newsworthy. Members of the media are particularly likely to report events that are of particular personal, cultural, or political relevance to its audience.³⁷⁵ Some have noted that the public's apparent obsession with celebrities often influences reporting choices. Risks that impact celebrities or public figures receive greater attention than they would otherwise.³⁷⁶ While the media are particularly interested in some kinds of subject matter, there are certain types of stories reporters are careful to avoid. Some threats are categorized as unpalatable and are rarely (or gingerly) reported. For instance, the media is much more likely to report the murder or sexual assault of a child when the perpetrator is a stranger, as opposed to a family member.³⁷⁷ Hence, although the incidence of violence against women and children is much higher at the hands of family members, media reports would lead to the conclusion that stranger attacks are more frequent.³⁷⁸

3. *The Media as Facilitator: Social Amplification and Availability Cascades*

When an event with negative effects occurs, it can serve as a signal, portending future harm.³⁷⁹ However, the degree to which the event assumes significance for risk perception varies widely.³⁸⁰ The media's portrayal of a particular signal can profoundly influence the

dominated by assurances by the industry that breast implants were safe. See, e.g., *The MacNeil/Lehrer NewsHour* (PBS television broadcast Sept. 13, 1995); Gina Kolata, *New Study Finds No Link Between Implants and Illness*, N.Y. TIMES, June 22, 1995, at A18.

³⁷⁵ Hughes et al., *supra* note 365, at 256.

³⁷⁶ *Id.* at 257.

³⁷⁷ *Id.*

³⁷⁸ *Id.* (stating that many more children are killed by the hands of their mothers or fathers each year than by strangers); see also Molly J. Walker Wilson, *An Evolutionary Perspective on Male Violence: Practical and Policy Implications*, 32 AM. J. CRIM. L. 291, 293 (2005).

³⁷⁹ Pidgeon, *supra* note 60 ("As a key part of [the] communication process, risk events and their characteristics become portrayed through various risk signals (images, signs, and symbols) which in turn interact with a wide range of psychological, social, institutional or cultural processes in ways that intensify or attenuate perceptions of risk.").

³⁸⁰ Kasperson & Kasperson, *supra* note 18, at 96 ("[T]he human experience of risk is simultaneously an experience of potential harm and the ways by which institutions and people process and interpret these threats." Risk analysis "requires an approach that is capable of illuminating risk in its full complexity[and] is sensitive to the social settings in which risk occurs" while recognizing "that social interactions may either amplify or attenuate the signals to society about the risk.").

significance to the public of that signal.³⁸¹ In this role, the media acts as an amplification station for the information. There are four ways in which amplification stations may increase the social amplification of a risk: volume, whether the information is disputed, the extent to which the information is dramatized, and the symbolic connotations to the information.³⁸² After an amplification station sends out information and a listener receives it, the information can then be amplified again resulting in behavioral responses creating secondary effects and possibly third-order effects. These are ripple effects.³⁸³

In a first-order effect, a large volume of information flow about a particular risk can serve to amplify the perception of risk. In a second-order effect, extensive coverage of a particular event may result in increased attention from the public, which may, in turn, result in additional media focus.³⁸⁴ To the extent that the risk is debated, resulting uncertainty can increase public anxiety.³⁸⁵ Moreover, sensationalistic accounts of an event, designed to increase interest, can serve to heighten concern. Sensational news stories generally rely on vivid reenactments or recounts, which increase awareness and memory for the event long after initial exposure.³⁸⁶ Finally, facilitators and the media both use symbolic language designed to heighten drama, and the use of such language can result in further amplification of risk perception.³⁸⁷

The importance of memorable and emotionally relevant stimuli for risk perception is critical to understanding the effect of the media in public risk response.³⁸⁸ A death from an event such as an airplane crash is 6000 times more likely to be reported by the media than someone dying from cancer, although the risk of death from air travel is far less than the risk from cancer.³⁸⁹ The media also frequently increase coverage about events that occur with declining frequency, while decreasing coverage about events that are increasing in

³⁸¹ See Lynn J. Frewer et al., *The Media and Genetically Modified Foods: Evidence in Support of the Social Amplification of Risk*, 22 RISK ANALYSIS 701, 702 (2002).

³⁸² Kasperson et al., *supra* note 1, at 184 (providing a detailed description of this ripple effect and a visual representation of this phenomenon).

³⁸³ *Id.* at 182, 183 fig.2 (same).

³⁸⁴ *Id.* at 184; see also Frewer et al., *supra* note 381 (providing contrasting examples of how the volume of information can influence the social amplification of risk).

³⁸⁵ Kasperson et al., *supra* note 1, at 184.

³⁸⁶ *Id.* at 184–85.

³⁸⁷ *Id.* at 185.

³⁸⁸ SUNSTEIN, *supra* note 185, at 33–35.

³⁸⁹ Hughes et al., *supra* note 365, at 250.

frequency. For example, media coverage of salmonella poisoning incidents is decreasing even though the number of incidents is on the rise.³⁹⁰ Similarly, the number of stories reporting on dangers posed by environmental pollutants is increasing, while pollution levels are declining.³⁹¹ The media can mislead members of the public, amplifying fear about some risks, while attenuating concerns over other risks.³⁹²

In many ways, the media is a fitting note upon which to conclude this Article. So much of the risk perception story is affected by communication through media channels: Internet, television, newspaper, magazines, radio.³⁹³ Although the members of the public interpret information through their own lenses, the manner in which the media frames the risk issue or debate unquestionably has enormous effects on initial evaluations, and often these effects are lasting. Moreover, nonmedia sources often use the media to control the hearts and minds of Americans.³⁹⁴

CONCLUSION

This Article has argued that the current dearth of understanding about how individuals evaluate and assess risk is a serious problem from the perspective of managing risk and public reactions to risk events. Policy makers often fail to systematically consider citizens' views on risks prior to making risk decisions. Lack of public input is problematic because, as scholars have noted, resource allocation is never value-neutral—particularly when risk management is concerned.³⁹⁵ For example, environmental law scholar Donald Hornstein asserts that “the substance of modern environmental law is a composite of moral decisions—about the levels of protection to be accorded such noncommodity values as human health, aesthetics, and responsibility toward nonhuman species and ecosystems—and instrumental decisions about the best way to achieve these morally

³⁹⁰ *Id.*

³⁹¹ *Id.*

³⁹² Kasperson et al., *supra* note 1, at 185.

³⁹³ Wahlberg & Sjöberg, *supra* note 147 (noting that, regardless of extent, it is undeniable that media does play a role in public risk perception).

³⁹⁴ See Francesco Sobbrío, *Indirect Lobbying and Media Bias 1* (March 2009) (unpublished Ph.D. dissertation, University of Southern California), available at http://mpira.ub.uni-muenchen.de/18215/1/MPRA_paper_18215.pdf (asserting that, behind the scenes, lobbyists indirectly control and bias the media in their favor).

³⁹⁵ See generally Kahan, *supra* note 26.

based goals.”³⁹⁶ All risk decisions involve judgments about the most appropriate way to balance benefits against costs, allocate resources, and distribute hazard potentials; hence, such decisions often implicate complex and value-laden questions about equality and fairness.³⁹⁷

Although there is debate about how to manage risk—and who should manage it—there ought not be any dispute as to the necessity of a comprehensive public risk perception model. The need for a better understanding of how risk information is received and evaluated is manifest in data collected from survey studies on individual attitudes about risk. Renowned risk researcher Paul Slovic notes that

Another consistent result from psychometric studies of expressed preferences is that people tend to view current risk levels as unacceptably high for most activities. The gap between perceived and desired risk levels suggests that *people are not satisfied with the way that market and other regulatory mechanisms have balanced risks and benefits.*³⁹⁸

If risk decisions are to well serve the public, the decisions must be crafted with some understanding of the needs and desires of the human beings who are at risk.

The mandate for getting a handle on public risk perception is so profound that it has served as a primary impetus for risk perception research to date. Risk analysts—as members of society and the human race—have a critical role to play in risk policy. Judgments of risk analysts, however, have limited value on their own. Because experts are not outside of the cultural milieu, they, like others, are influenced by inevitable cognitive patterns, emotion-based responses, and political and moral concerns.³⁹⁹ Expert analysis and opinion should be informed by careful consideration of the preferences of lay members of the public.

This Article draws on prior empirical and theoretical work to develop a comprehensive model of public risk perception that can

³⁹⁶ See Hornstein, *supra* note 24, at 631.

³⁹⁷ See, e.g., ROGER E. KASPERSON ET AL., EQUITY ISSUES IN RADIOACTIVE WASTE MANAGEMENT 331 (Robert E. Kasperson ed., 1983).

³⁹⁸ Slovic, *supra* note 8, at 283 (emphasis added).

³⁹⁹ See Baruch Fischhoff et al., *Defining Risk*, 17 POL’Y SCI. 123, 124 (1984) (“No definition [of risk] is advanced as the correct one, because there is no one definition that is suitable for all problems. Rather, the choice of definition is a political one, expressing someone’s views regarding the importance of different adverse effects in a particular situation. Such determinations should not be the exclusive province of scientists, who have no special insight into what society should value.”).

assist risk managers and inspire future discussion about the role of individual citizens in risk decisions. Included in this analysis is not only a discussion of how the characteristics of a risk influence citizens' views, but also about how perceptions of risk are influenced by features of the communication context, neutral and non-neutral communicators, characteristics of any relevant subpopulation at risk, and cultural factors, among other considerations. The compilation of factors presented in this Article is designed not only to serve as a starting point for fresh consideration of how hazards ought to be managed, but also it is presented as a model for predicting public risk response. Significant implications follow. Public panics may be legitimate, or they may be more harmful than they are helpful.⁴⁰⁰ Some communication campaigns may be timely and informative, yet others may help to fuel a perfect storm, creating unnecessary anxiety and wasted effort.⁴⁰¹ With heightened awareness of the social and cultural factors that drive risk assessment, lawmakers can better manage risks and address public risk responses proactively.

⁴⁰⁰ See, e.g., Albert M. Rosenblatt, *Under Stress: The Constitution in Times of National Ordeal*, 12 U. PA. J. CONST. L. 143, 145 (2009) (discussing 9/11 and the USA PATRIOT Act); Dara L. Schottenfeld, *Witches and Communists and Internet Sex Offenders, Oh My: Why It Is Time to Call Off the Hunt*, 20 ST. THOMAS L. REV. 359, 359 (2008) (discussing the Salem witch trial panic in relation to modern day "witch hunts" involving Internet sex offenders).

⁴⁰¹ For example, the Drug Abuse Resistance Education (DARE) is a helpful campaign. See DRUG ABUSE RESISTANCE EDUCATION, ABOUT D.A.R.E., <http://www.dare.com/home/default.asp> (last visited Sept. 30, 2011). Conversely, Bert the Turtle during the Cold War was needless and anxiety producing. nuclearvault, *Duck and Cover (1951) Bert the Turtle Civil Defense Film*, YOUTUBE (July 11, 2009), <http://www.youtube.com/watch?v=IKqXu-5jw60>.

