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the Tyranny of the Experts

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CULTURAL UNDERSTANDINGS OF RISK AND THE TYRANNY OF THE EXPERTS

*Molly J. Walker Wilson**

ABSTRACT

Every year, law-makers 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, most actions are taken without systematic consideration of the preferences of the very people whose welfare is at stake. There are two reasons for this. First, the dominance of Traditional Risk Analysis, with its emphasis on statistics and cost-benefit analysis, has downplayed 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. There has been virtually no acknowledgment that ex ante consideration of the convictions and passions of the public 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. Another consequence of the focus on traditional risk analysis is that no comprehensive model of public risk perception has been developed. Existing theoretical perspectives and methodologies have not offered a comprehensive model, and each has suffered from limitations of one kind or another. This Article argues that law makers 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 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

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characteristics of public responses that compose social amplification are essential elements in determining the nature and magnitude of risk.¹

Risk management decisions are not being made . . . in part because there are no clear criteria.²

Each day, Americans live with risk-management laws and policies that have been formulated by lawmakers who lack the most basic understanding 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 a few, on behalf of many. The allocation of responsibility for such decisions to a particular group of individuals is inevitable; few would 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, it cannot anticipate human fear, nor can it evaluate two harms with equivalent expected costs to determine objectively which 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 law makers 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 homebuyer 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

¹ Roger E. Kasperson, Ortwin Renn, Paul Slovic, et al. *The Social Amplification of Risk: A Conceptual Framework*, 8, 2 Risk Analysis 177, 181 (1988).

² Paul Slovic, THE PERCEPTION OF RISK 21 (2000) (hereinafter, "PERCEPTION").

³ "Simply put 'governance' means 'the process of decision-making and the process by which decisions are implemented (or not implemented).'" See <http://www.unescap.org/pdd/prs/ProjectActivities/Ongoing/gg/governance.asp> (last visited, Aug. 28, 2010).

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.

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, multi-faceted process. Several theoretical and empirical perspectives on risk perception have been offered by influential thinkers such as Paul Slovic, Roger Kasperson, 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 investigating and understanding risk perception make 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 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

⁴ The exception is Roger E. Kasperson, Ortwin Renn, Paul Slovic, et al. *The Social Amplification of Risk: A Conceptual Framework*, 8, 2 Risk Analysis 177 (1988), which is an important work, but is subject to a number of shortcomings discussed in Section I, *infra*.

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, Ian H. Langford, & Timothy O’Riordan, *A Quantitative Test of the Cultural Theory of Risk Perceptions: Comparison with the Psychometric Paradigm*, 18 Risk Anal., 635, 635 (1998) (finding that “The 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 Anal. 665 (2002) (arguing that recent scholarship touting cultural and psychometric risk analysis approaches have been inappropriately optimistic about the approaches).

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.⁶

The Article proceeds in four parts. Section I begins by describing the current risk climate, noting the rising concern over modern risks created by advances in science and technology. Section II explains the primary contributions to the risk perception literature, examining each of the major theoretical perspectives to date. Section III draws on these existing perspectives to derive a list of the most important considerations for risk perception, and introduces several new contributions. Section IV addresses the major considerations from Section III, synthesizing the major work from Section II in order to provide a comprehensive model that includes risk-amplifying and attenuating factors.⁷

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.⁸ So much of law and policy is driven by current wisdom regarding potential sources of harm, that much of the time, threat containment 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 necessarily 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

⁶ The Model appears in the Appendix, at the end of the Article.

⁷ 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 4.

⁸ 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); See Dennis J. Paustenbach, *Retrospective on U.S. Health Risk Assessment: How Others Can Benefit*, 6 RISK 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, Frewer, L. J., Scholderer, J., & Bredahl, L., *Communicating about the Risks and Benefits of Genetically Modified Foods: The Mediating Role of Trust* 23, 6 Risk Analysis (2003).

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.⁹

The German sociologist Ulrich Beck notes that we have moved from a culture of scarcity to a culture of risk.¹⁰ Today, in western societies, more people than ever before have their basic needs met.¹¹ 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.¹² 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. However, these technologies 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.¹³ America, along with other western cultures, has arguably become risk-obsessed.¹⁴ Commentators have noted the prevalence of fear in our culture.¹⁵ Political scientist Aaron Wildavsky has famously remarked, “How extraordinary! The richest, longest-lived, best protected, most resourceful

⁹ Paul Slovic, *Perception of Risk*, 236 *Science* 280, 280 (1987) (hereinafter *Perception II*).

¹⁰ Ulrich Beck, *RISK SOCIETY: TOWARD A NEW MODERNITY* 26 (1992).

¹¹ See Kenneth E. Boulding, Michael Kammen, & Seymour Martin Lipset, *From Abundance to Scarcity: Implications for the American Tradition*, THE HAMMOND LECT. SER. (1878)(stating that, “the 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.”)

¹² See Stephen D. Oliner & Daniel E. Sichel, *The Resurgence of Growth in the late 1990's: Is Information Technology the Story?*, 14 *J. of Econ. Persp.* 3, 4 (2000).

¹³ See Beck, *supra* note 9, at 19 (suggesting that the “contribution to productivity growth from the use of information technology- including computer hardware, software, and communication equipment- surged in the second half of the 1990s.”)

¹⁴ See David L. Altheide, *The News Media, the Problem Frame, and the Production of Fear*, 38 *Sociological Q.* 647, 664 (1997)(“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.”)

¹⁵ See generally, Aaron Cohl, *ARE WE SCARING OURSELVES TO DEATH?: HOW PESSIMISM, PARANOIA, AND A MISGUIDED MEDIA ARE LEADING US TOWARD DISASTER* (1997);

civilization, with the highest degree of insight into its own technology, is on its way to becoming the most frightened.”¹⁶

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.¹⁷ 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.¹⁸ 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.¹⁹ 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.²⁰ Beck notes that “in the modernization process, more and more destructive forces are being unleashed, forces before which the human imagination stands in awe.”²¹ 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 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 consequences. First, 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

¹⁶ Aron Wildavsky, *No risk Is the Highest Risk of All*, 67 *Am. Scientist* 32, 32 (1979).

¹⁷ See PUBLIC OPINION 2 (1987). This data is clearly outdated, but more recent data suggests a continuing trend in a similar direction.

¹⁸ See Slovic, *Perception II supra* note 8 at 280.

¹⁹ See Roger E. Kasperson & Jeanne X. Kasperson, *The Social Amplification and Attenuation of Risk*, 545 *Annals of the Am. Academy of Pol. and Soc. Science* 95, 96 (1996).

The familiar scourges of famine, disease, and pestilence no longer contaminate 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 part of the globe, and harms arising from the flow and control of information.

²⁰ See Beck, *supra* note 9, at 19 (“Atomic accidents are accidents no more in the limited sense of the word ‘accident’. They outlast generations.”) *Id.* (internal parenthetical omitted.)

²¹ *Id.* at 19.

unrest. Moreover, distrust 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. 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 be inevitably 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, is 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 assessments is undemocratic. Finally, Hornstein stresses that there is a rational basis for citizens' risk evaluations; even where they might not comport with statistical probabilities, they reflect legitimate personal preferences.²⁵

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.²⁶ 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. 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-

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 in Section III, *infra*.

²³ That members of the public are prone to mistakes during decision tasks is a theme of law scholar Cass Sunstein's work, as manifest in the article by Kuran and Sunstein referenced below (*see note 27, supra*).

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

²⁵ *Id.* at 610-16. This view is similar to that of Dan Kahan's, which is detailed below. *See note 102, supra* and accompanying text; *see also*, Section II. E. *supra*, and accompanying text.

²⁶ *See* Appendix.

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

centered approach to risk evaluation—was pioneered by Baruch Fischhoff, Paul Slovic, and Sarah Lichtenstein.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 characteristics of risk cause people particular concern. A decade after the seminal psychometric paper, Roger Kasperon 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. 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 (ie, non-rational) reactions to risk as manifestations of culturally shaped (and valuable) expressions of underlying world views. Kahan, like Hornstein, advocates a greater role for individual preferences in risk management. Each of these theoretical perspectives is discussed in more detail below.

A. *Traditional Risk Analysis*

The most influential approach to risk management has been and remains traditional risk analysis. This 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 unfortunate

& Eric A. Posner eds., 2001). *See also*, Richard 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 (the more common domain of the term) or private.”)(internal citation omitted).

²⁸ *See* Baruch Fischhoff, Paul Slovic, Sarah Lichtenstein, et al., *How Safe Is Safe Enough? A Psychometric Study of Attitudes Towards Technological Risks and Benefits* 9 Pol. Sci. 127, 128 (1978).

²⁹ Timur Kuran & Cass R. Sunstein, *Availability Cascades and Risk Regulation*, 51 STAN. L. REV. 683,703 (1999).

events.”³⁰ 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, although the method tends to be consistent.³¹ Within this methodology, attempts have been made to create universal, international standards by which risk can be assessed and managed.³² Traditional risk analysis has been conceived of as a method for determining an appropriate response on a large-scale to wide-spread or catastrophic risk³³

Traditional risk analysis has relied on a purportedly value-neutral formula: [probability of risk occurring] x [cost associated with that risk event].³⁴ The formula-based approach focuses largely on hazards related to new technologies, environmental degradation, and public health.³⁵ It was, and still is, “distinctly ‘expert-centered’ and uncomfortable with (or even hostile to) considering the views of diverse, nonexpert parties.”³⁶ 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.³⁷ 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.³⁸ However, there is a more fundamental issue, relating to the

³⁰ See generally, Douglas Hubbard, *THE FAILURE OF RISK MANAGEMENT: WHY IT’S BROKEN AND HOW TO FIX IT* (2009).

³¹ 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. See, *Committee Draft of ISO 31000 Risk Management*, International Organization for Standardization (2009)(on file with author).

³² For example, the International Organization for Standardization has codified a family of standards relating to risk called ISO 31000. The purpose of ISO 31000:2009 is to provide principles and generic guidelines on risk management. *Id.*

³³ 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).

³⁴ See Kasperson, Renn, Slovic, et al. *supra* note 4, at 2. The formula parallels one side of the well-know Coase Theorem, expressed as $B < PL$, and famously cited by Judge Learned Hand of 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, where 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. *Id.*

³⁵ See Gary E. Machlis & Eugene A Rosa, *Desired Risk: Broadening the Social Amplification of Risk Framework*, 10 Risk Anal. 161, 161 (1989) (arguing that one important—but oft neglected—aspect of risk behavior is that of risks that are freely assumed).

³⁶ See Paul Slovic, *Trust, Emotion, Sex, Politics, and Science: Surveying the Risk Assessment Battlefield*, 1997 U. Chi. Legal F. 59, 59 (1997)

³⁷ See Beck, *supra* note 9, at 4 (from Scott Lash & Brian Wynne, *Introduction*).

³⁸ See e.g., Douglas Hubbard, *THE FAILURE OF RISK MANAGEMENT: WHY IT’S BROKEN AND HOW TO FIX IT* 46 (2009).

inputs; traditional risk analysis gives little or no consideration to the human element; it either ignores or substantially underemphasizes public sentiment regarding potential threats.³⁹ This feature of risk analysis means that policymakers are (1) unable to predict how members of society will view specific dangers as the threats become salient to the public (2) ill equipped to craft responses to risk that take into account public fear of these hazards.⁴⁰ 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.”⁴¹ Beck similarly worries that “as long as the debate is “conducted exclusively or dominantly in the terms and formulas of *natural* science” the danger exists that the “terms will inadvertently include human beings in the picture only as *organic material* . . . it runs the risk of atrophying into a discussion of nature *without* people, without asking about matters of social and cultural significance.”⁴²

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 the relative risk of various technologies is not appropriately determined exclusively by risk experts, who may not have a clear sense for the current value of a particular technology to the public at large.⁴³

B. Psychometric Study of Risk Perception

³⁹ See Kasperson, Renn, Slovic, et al. *supra* note 4, at 177.

⁴⁰ 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.

- (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.
- (11) Risk management should be capable of continual improvement and enhancement.

See *Committee Draft of ISO*, *supra* note 30.

⁴¹ See Kasperson, Renn, Slovic, et al. *supra* note 4 at 178.

⁴² 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 Effects of Psychological Perceptions on the Willing-to-Pay to Reduce Risk*, 6 *J. of Risk and Uncertainty* 75, 76 (1993).

⁴³ See Section I. E., *infra* (for a discussion of the cultural evaluator theory of risk perception).

The psychometric study of risk was a response to the predominant method employed by traditional risk analysis, known as risk-benefit analysis, which is based upon cost-benefit analysis, but is specific to risk management. Risk-benefit is a method of analysis that asks “Is this product (activity, technology) acceptably safe? Alternatively, how safe is safe enough?”⁴⁴ Baruch Fischhoff along with Paul Slovic and colleagues believed that the risk-benefit analysis was inadequate for answering those questions.⁴⁵ Specifically, they took issue with the “revealed preference” theory of risk-benefit analysis, which assumes that through trial and error, society has determined an optimum level of risk for a given activity.⁴⁶ The primary criticism of psychometric analysis is that it ignores the fact that society’s preferences fluctuate.⁴⁷ “Revealed preferences” also assumes that the market correctly reflects optimal risk level and it discounts the possibility that the public is accepting a risk because it is ignorant of the potential for harm or the potential for elimination of harm.⁴⁸

In response to the perceived weaknesses of this method of risk analysis, Fischhoff and colleagues proposed a surprisingly little-used method of ascertaining the “acceptability” of risk—they asked people questions.⁴⁹ The goal was to derive a “cognitive map”⁵⁰ or a taxonomy for hazards that could serve as a tool for understanding and predicting risk responses.⁵¹ 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.”⁵² The initial method and the results were presented in a 1978 empirical paper. Although the methodology was not without drawbacks,⁵³ 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 “social amplification of risk” theory advanced the field further, building on the previous work by adding social, cultural, and other dynamic aspects of risk perception to the equation.⁵⁴ In 1988, Roger Kasperson and his colleagues

⁴⁴ See Fischhoff, Slovic, Lichtenstein, et al., *supra* note 27.

⁴⁵ The work with which Fischhoff, Slovic, and colleagues took issue is Chauncey Starr *Social Benefit Versus Technological Risk*, 165, *Science*, 1232 (1969).

⁴⁶ *Id.*

⁴⁷ See Fischhoff, Slovic, & Lichtenstein, et al. *supra* note 27, at 129.

⁴⁸ See *id.* at 128.

⁴⁹ See *id.* at 127.

⁵⁰ See Slovic, *PERCEPTION supra* note 2, at 222.

⁵¹ See Slovic, *Perception II supra* note 8, at 287.

⁵² *Id.*

⁵³ 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.

⁵⁴ See *generally*, Kasperson, Renn, Slovic, et al. *supra* note 4.

introduced the novel framework, which sought to describe active and interactive forces through which risk perceptions are amplified and attenuated.⁵⁵ Social amplification of risk (SAR) included additional influences not 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 risk is assumed voluntarily, familiarity with the source of the danger, and the potential for catastrophe.⁵⁶ 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, such as the impacts of information communication.⁵⁷ 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.⁵⁸ 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."⁵⁹

1. Amplification Mechanisms

SAR identifies "amplification stations" and steps whereby, either through direct experience, or more commonly, by learning from other sources, individuals develop heightened sensitivity to various risks.⁶⁰ Kasperson et al. describe this process at several levels. At the *message* level, SAR parses the communication into factual information, inferential messages, and conclusions, the formation of which depend upon which cultural symbols and values are implicated.⁶¹ In addition to the content of the message, the number of times the message is

⁵⁵ *Id.*

⁵⁶ *Id.* See Machlis & Rosa, *supra* note 22, at 164.

⁵⁷ .See generally, Kasperson, Renn, Slovic, et al. *supra* note 4; See also, Arie Rip, *Should Social Amplification of Risk be Counteracted?* 8,2 Risk Analysis 193, 196 (1988).

⁵⁸ Kasperson, Renn, Slovic, et al. *supra* note 4, at 178 The authors admit that other scholars have written in a less comprehensive fashion about the dynamic social aspect of risk analysis. See B. Wynne, *Public Perceptions of Risk*, in Surrey, J. (ed.) 246-259 THE URBAN TRANSPORTATION OF IRRADIATED FUEL (1984); see also generally, B. Johnson & V. Covello, SOCIAL AND CULTURAL CONSTRUCTION OF RISK (1987).

⁵⁹ See Kasperson, Renn, Slovic, et al. *supra* note 4 at 178. See also, Nick Pidgeon, *Risk Communication and the Social Amplification of Risk : Theory, Evidence, and Policy Implications*, 4 Risk Decision and Policy 145, 146 (1999);

⁶⁰ See Kasperson, Renn, Slovic, et al. *supra* note 4, at 184; See also, Pidgeon, *supra* note 59, at 147 (1999);

⁶¹ Kasperson, Renn, Slovic, et al. *supra* note 4, at 180.

repeated may affect judgments about accuracy.⁶² 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.⁶³ Recipients of the information filter and decode the signals they receive and ultimately interpret and often communicate that information to others, forming conclusions in the process.⁶⁴

2. Secondary and Third-order Impacts

Once recipients have interpreted the information, bringing personal experience and value judgments to bear in the process, they 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.⁶⁵ 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.⁶⁶

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 “symbolic connotations” inherent in the information.⁶⁷ 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, increasing the public’s attention to the risk.⁶⁸

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

⁶² *Id.* See also, See Kasperson & Kasperson, *supra* note 18, at 96. See also, Pidgeon, *supra* note 59, at 147 (1999);

⁶³ Kasperson, Renn, Slovic, et al. *supra* note 4, at 181.

⁶⁴ *Id.*

⁶⁵ *Id.*

⁶⁶ Kasperson, Renn, Slovic, et al. *supra* note 4, at 182; See also, Pidgeon, *supra* note 59, at 147(explaining that some events will lead to spreading “ripples” of secondary consequences which go beyond the initial impact of the event); See also, Machlis & Rosa, *supra* note 22, at 163.

⁶⁷ See Kasperson, Renn, Slovic, et al. *supra* note 4 at 184.

⁶⁸ See *id.* (pointing out that repeated coverage of a particular hazard can result in public “scares”).

attenuation.⁶⁹ 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.⁷⁰ 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.⁷¹

4. Features of the Social Environment

Finally, recipients of information about risks have characteristics that help to determine how the information will be received and processed. For example, human beings are limited in their ability to process information. As a result, they rely on cognitive rules of thumb, or heuristics, when they process information.⁷² Although the use of heuristics is often helpful, it can also result in misleading or biased judgments.⁷³ Cultural values, like heuristics, shape the lens through which information is evaluated and assimilated, helping to determine which dangers are given high priority.⁷⁴ 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 conflict."⁷⁵ Kasperson et al. also claim that the "signal" sent by a risk event and the "stigma" associated with certain locations or processes can influence risk perception.⁷⁶

⁶⁹ William J. Burns, Paul Slovic, Roger E. Kasperson, Jeanne X. Kasperson, Ortwinn Renn, & Srinivas Emani, *Incorporating Structural Models into Research on the Social Amplification of Risk: Implications for Theory Construction and Decision Making* 13, 6 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).

⁷⁰ See Kasperson & Kasperson, *supra* note 18 at 96.

⁷¹ Kasperson, Renn, Slovic, et al. *supra* note 4, 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." *Id.*)

⁷² Heuristics and biases are discussed in greater detail in Section II, *infra*.

⁷³ See Kasperson, Renn, Slovic, et al. *supra* note 4, at 185 (citing Daniel Kahneman & Amos Tversky, JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES (1982)).

⁷⁴ See Kasperson, Renn, Slovic, et al. *supra* note 4, at 185. An example of just such a value is the notion that society's children, because they are uniquely vulnerable members of society and because they are the "future" or our civilization, are worthy of special protection. This sentiment would result in a higher level of concern over risks that could negatively impact young members of society.

⁷⁵ See Kasperson, Renn, Slovic, et al. *supra* note 4, at 185.

⁷⁶ 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

This type of polarization and galvanization around an issue or event is a typical phenomenon in politics, and 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 2006,⁷⁷ proved disastrous for countless Americans, many of whom lost their jobs and ultimately their homes in the ensuing financial meltdown.⁷⁸ 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 Program⁷⁹ (signed into law by U.S. President George W. Bush on October 3, 2008), the election of Barack Obama to the presidency one month later, and Obama's subsequent push for healthcare reform were evaluated in terms of the on-going 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, "(b)y almost every conceivable measure Americans are less positive and more critical of government these days. 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."⁸⁰

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?⁸¹

environmental factors. Ambiguity in how to categorize various SAR factors is one drawback of the theory.

⁷⁷ 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, found at: http://www.nytimes.com/2006/07/26/business/26home.html?_r=1&oref=login&ref=business&pagewanted=print (last visited, Aug. 27, 2010).

⁷⁸ See, *Three Top Economists Agree 2009 Worst Financial Crisis Since Great Depression* REUTERS, February 29, 2009, found at, <http://www.reuters.com/article/pressRelease/idUS193520+27-Feb-2009+BW20090227> (last visited, Aug. 28, 2010).

⁷⁹ For more on TARP, see <http://www.federalreserve.gov/bankinfo/tarpinfo.htm> (last visited, Aug. 27, 2010).

⁸⁰ Press Release, The Pew Research Center for the People and the Press, *The People and Their Government: Distrust, Discontent, Anger, and Partisan Rancor* (April 18, 2010) (found at: <http://people-press.org/reports/pdf/606.pdf>, last visited, Aug. 24, 2010).

⁸¹ See Kuran & Sunstein, *supra* note 28 at 703.

This is the question Timur Kuran and Cass Sunstein posed more than a decade after Kasperson et al. published their initial paper on social amplification of risk. The answer, according to Kuran and Sunstein is availability cascades.⁸² Kuran and Sunstein based their notion of availability cascades on the work of Kahneman and Tversky, who described the availability heuristic twenty-five years earlier.⁸³ The availability heuristic was described by Kahneman and Tversky 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.”⁸⁴ The availability heuristic has gained traction in legal scholarship, and is defined 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.⁸⁵

⁸² Although the first published paper containing an extensive discussion of availability cascades was *Availability Cascades and Risk Regulation* (Kuran & Sunstein, *supra* note 28), several other law review articles referenced the concept in 1998, citing to the Kuran & Sunstein paper as a work in progress: see e.g., Cass R. Sunstein, *Behavioral Analysis of Law*, 64 U. Chi. L. Rev. 1175 (1997); see also, Christine Jolls, Cass R. Sunstein, & Richard Thaler, *A Behavioral Approach to Law and Economics*, 50 Stan. L. Rev. 1471 (1998); see also, Cass R. Sunstein, *How Law Constructs Preferences*, 86 Geo. L.J. (1998).

⁸³ See Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, 185 Science 1124, 1127 (1974) (introducing “availability” along with other heuristics and biases). See also, Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, in *Judgment Under Uncertainty: Heuristics and Biases* 3, 11 (Daniel Kahneman, Paul Slovic & Amos Tversky eds., 1982). For some early law review pieces discussing heuristical processing and responses in legal frameworks, see Mark G. Kelman et al., *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 (1979) (“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.”).

⁸⁴ See Tversky & Kahneman, *supra* note at 83, at 1127.

⁸⁵ I will have a great deal more to say about the availability heuristic at a later point in this Article. The characteristics (frequency, recency, and vividness) that have been demonstrated to 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. For more on the availability heuristic, see Kuran & Sunstein, *supra* note 28, at 683-91; Jolls, Sunstein, & Thaler, *supra* note 82 at 1519; 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); see also, Russell B. Korobkin & Thomas S. Ulen, *Law and Behavioral Science: Removing the Rationality Assumption from Law and Economics*, 88 CAL. L. REV. 1051, 1091 (2000); see also, Justin Pidot, *The Applicability of Nuisance Law to Invasive Plants: Can Common Law Liability Inspire Government Action?*, 24 VA. ENVTL. L.J. 183, 222-23 (2005); see also Cass R. Sunstein, *Precautions Against What? The Availability Heuristic and Cross-Cultural Risk Perception*, 57 ALA. L. REV. 75, 77 (2005)[hereinafter, Sunstein, *Precautions*].

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.⁸⁶ Availability cascades occur when information about potential harms travels through social communication channels, and a prevailing wisdom is created and reinforced.⁸⁷ The process occurs when “expressed perceptions trigger chains of individual responses that make these perceptions appear increasingly plausible through their rising availability in public discourse.”⁸⁸ The motivations behind these cascades may be information or reputational.⁸⁹ A reputational cascade occurs when individuals espouse views because doing so carries with it some sort of social advantage.⁹⁰ 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.⁹¹ 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.⁹² The informational cascade is therefore driven by individuals’ search for data about their world.⁹³

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 communicating them to other members of

⁸⁶ See Kuran & Sunstein, *supra* note 28, at 685.

⁸⁷ See Sunstein, *Precautions*, *supra* note 68, at 77.

⁸⁸ See Kuran & Sunstein, *supra* note 28, 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. 102, 111 (2009) (discussing the “trigger phase” in their model of the availability campaign).

⁸⁹ Kuran & Sunstein, *supra* note 28, 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). See also generally, Robert B. Cialdini, Raymond R. Reno & Carl A. Kallgren, *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).

⁹⁰ 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 . . .”).

⁹¹ *Id.*

⁹² See Sushil Bikhchandani, David Hirshleifer, & Ivo Welch, *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 Kuran & Sunstein, *supra* note 28, at 686; see also, Sushil Bikhchandani et al., *Learning from the Behavior of Others: Conformity, Fads, and Informational Cascades*, 12 J. Econ. Persp. 151 (1998).

⁹³ 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) (“... medicine 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 also generally, Bikhchandani et al., *supra* note 75 (for a more general discussion of herd behavior).

society.⁹⁴ Availability cascades are reinforced and expanded in this fashion. 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”⁹⁵ through social discourse is often incorrect or misleading. Socially communicated risk information contains inflated estimates of risk and causes “public panics.” 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.⁹⁶ 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 can reinforce availability effects, which in turn, can lead to widespread misperceptions.⁹⁷

Although the primary article was coauthored by Kuran and Sunstein, Sunstein has written a series of article 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 reactive. He makes the case that public panics can influence policy, resulting in inefficient and potentially harmful legislation.⁹⁸ Sunstein also takes issue with the precautionary principle, namely the notion that when a potential

⁹⁴ Sunstein, *Precautions*, *supra* note 68, at 96; *See also*, Recent Case, *Immigration Law – Administrative Adjudication – Third and Seventh Circuits Condemn Pattern of Error in Immigration Courts – Wang v. Attorney*, 423 F. 3D 260 (3D CIR. 2005), and *Benslimane v. Gonzales*, 430 F.3D 828, 119 HARV. L. REV. 2596, 2601 (2006) (explaining that politicians and the media repeat salient examples in a self-reinforcing availability cascade).

⁹⁵ 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.” Cass R. Sunstein, *LAWS OF FEAR: BEYOND THE PRECAUTIONARY PRINCIPLE* (2005). [hereinafter Sunstein, *LAWS OF FEAR*]

⁹⁶ *See* Kuran & Sunstein, *supra* note 28, at 685 (“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.”)

⁹⁷ *See* Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, in *Judgment Under Uncertainty: Heuristics and Biases* 3, 11-14 (in Daniel Kahneman, Paul Slovic & Amos Tversky eds., 1982) (describing how the availability heuristic can lead to errors in reasoning and decision-making); *see also* Kuran & Sunstein *supra* note 64, 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”); *see also*, Kuran & Sunstein *supra* note 64, 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 citations omitted).

⁹⁸ Cass R. Sunstein, *Cognition and Cost-Benefit Analysis*, 29 J. LEGAL STUD. 1059, 1067 (2000) (hereinafter Sunstein, *Cognition*) (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* Sunstein, *Precautions*, *supra* note 68, at 98 (noting that cascade effects caused by the availability heuristic can produce a public demand for regulation regardless of the actual risk).

risk is identified, steps should be taken to guard against the risk, even where 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.

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.⁹⁹ 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.¹⁰⁰ Instead, they argue that “facts cannot be separated from values in policy-related science contexts.”¹⁰¹ Put differently, risk judgments are socially constructed, and do not exist as independent “truths” to be discovered.¹⁰² For the proponent of a cultural model, affective (emotional) responses to risk are expressions of socially and culturally derived values.¹⁰³ 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

⁹⁹ Slovic, PERCEPTION *supra* note 2, at 59. “[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 on perceptions of risk that are subjective, often hypothetical, emotional, foolish, and irrational; *see also*, Kuran & Sunstein, *supra* note 28, at 683 (Supporting the notion that emotions can cause irrational decision-making is 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. Implications of this view is that System 1 is necessary in situations where there is a lack of information and resources, but that it is more likely to result in error than System 2. Kahan's claim, *see* Dan M. Kahan, Two Conceptions of Emotion in Risk Regulation, 156 U. Pa. L. Rev. 741 (2008); Kasperson, Renn, Slovic, et al. *supra* note 4, at 181. *See* Fischhoff, Slovic, & Lichtenstein, *supra* note 31, at 128; Beck, *supra* note 9, at 24.

¹⁰⁰ And yet, “[a]ssessment procedures derived from the public health, toxicity, and engineering studies that have dominated the management programs of governments and corporations illuminate one portion of the risk complex while concealing others.” Kasperson & Kasperson, *supra* note 18, at 96; *See* Slovic, *Perception II supra* note 8 (arguing for the importance of the public's role in risk assessment).

¹⁰¹ Judith A. Bradbury, *The Policy Implications of Differing Concepts of Risk* 14 Sci., Tech. & Hum. Values, 380, 399 (1989).

¹⁰² *See id.*, at 381-82. (arguing that “factual” empirical evidence alone does not lead to any useful conclusions).

¹⁰³ *See generally*, Kahan, *supra* note 99.

about what it would *mean* for their cultural worldviews for society to credit the claim that that activity is dangerous and worthy of regulation.”¹⁰⁴

Cultural theory is sometimes discussed with reference to cultural “biases,” or patterns of social relationships and cultural understandings that result in particular worldviews.¹⁰⁵ A central feature of the theory is the notion that culturally derived values have legitimate influences over risk preferences.¹⁰⁶ The membership of an individual in a certain class—hierarchical, egalitarian, individualistic, and fatalistic—is believed to help gauge that individual’s risk tolerance and preferences.¹⁰⁷ 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 society.¹⁰⁸ 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.”¹⁰⁹ The often wholesale substitution of experts’ opinions for those of the public is particularly problematic when one considers data from studies suggesting that the public and experts hold divergent views about risks.¹¹⁰ Another critical aspect of the cultural evaluator model is the belief that individuals may have deeply personal reasons for choosing certain risks over others.¹¹¹ 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.

¹⁰⁴ *Id.*

¹⁰⁵ 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.

¹⁰⁶ Marris, Langford, O’Riordan, *supra* note 4, at 636.

¹⁰⁷ 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. See Richard Ellis, Michael Thompson & Aron Wildavsky, *CULTURAL THEORY* 5 (1990).

¹⁰⁸ See Ellis, Thompson, Wildavsky, *id.* at 5; see generally Kuran & Sunstein, *supra* note 28; see also, Sunstein, *LAWS OF FEAR*, *supra* note 95, at 126, for examples of works that propose substituting public risk decisions with those of unbiased experts.

¹⁰⁹ As Douglas writes, “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 some kinds of bias. . . .” Mary Douglas, *RISK AND BLAME: ESSAYS IN CULTURAL THEORY* 13 (1992). See also, Mary Douglas & Aaron Wildavsky, *Risk and Culture: An Essay on the Selection of Technical and Environmental Dangers* (1982).

¹¹⁰ See James Flynn & Paul Slovic, *Expert and Public Evaluations of Technological Risks: Search for Common Ground* 10 *Risk: Health Safety & Env’t* 333 (1999).

¹¹¹ Kahan, *supra* note 82, at 741.

The availability cascade and cultural evaluator theories offer opposing normative claims in the area of risk policy and response. Accordingly, Sunstein and Kahan have particular prescriptive agendas for risk managers and law makers. Rather than debating the merits of each claim in order to declare a victor, the current discussion extracts the elements underlying the predictive arguments. After distilling the data that serves as the basis for the normative arguments, the relevant information is incorporated 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, nor do they consistently learn from one another.¹¹² 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.¹¹³ The model represents a vital step toward a new understanding of how individuals assess and respond to potential threats. It 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 get a detailed picture of those risks reported by people to be most worrisome. However, this method suffers from the fact that it asks questions about risk in a socially static context.¹¹⁴ 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. None of the social dynamic is explicitly captured or explained by psychometric studies of risk perception.¹¹⁵ 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.¹¹⁶ An experimental setting is not necessarily representative of what occurs out there

¹¹² The exception is SAR, which takes into account psychometric risk analysis.

¹¹³ See Appendix.

¹¹⁴ See Sjöberg, *Policy Implications*, *supra* note 5, at 15.

¹¹⁵ 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 forthcoming about their own attitudes or behaviors.

¹¹⁶ See generally, Bradbury, *supra* note 84, at 383-84 (suggesting that psychometric studies provide a subjectivist interpretation within an artificial paradigm that may provide unreliable results).

by the water cooler, on the neighborhood sidewalk, or at dinner parties. Here 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 only for some of the empirically supported antecedents of risk perception.¹¹⁷ 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,”¹¹⁸ 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 is well documented from an empirical standpoint. Although the theory is compelling, its foundation is a normative claim, and its “proof” is historical anecdote. Because it is backward-looking, it lacks predictive power. Moreover, Kuran and Sunstein’s normative claim is subject to criticism on several fronts.¹¹⁹ First, it assumes that risks possessing certain features are worthy of attention and resource expenditure, while others are not.¹²⁰ Second, it also recommends handing over the decision making to “experts,” an approach that is increasingly questioned.¹²¹ As Beck has noted, “There is no expert on risk . . . [w]here and how does one draw the line between still acceptable and no longer acceptable exposures?”¹²² Third, unchecked deference to risk experts also undervalues the potential benefits stemming from social pressure for change.¹²³ Fourth, it assumes a unidirectional effect of social cascades. As Arie Rip points out “the focus as well as the concern is about intensification and the additional social costs accompanying ‘exaggerated’ responses . . . while there is no (equivalent discussion or examples)

¹¹⁷ Pidgeon, *supra* note 59, at 147.

¹¹⁸ Kasperson & Kasperson, *supra* note 18 at 96. *See also*, Wilson & Fuchs, *supra* note 71.

¹¹⁹ Kuran & Sunstein, *supra* note 28, 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 citations omitted)

¹²⁰ It claims 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 L.J.* ____ (forthcoming 2010). *See also generally*, Douglas, note .

¹²¹ *See* Sjöberg, *Policy Implications*, *supra* note 5, at 14 (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).

¹²² Beck, *supra* note 9 at 29 (emphasis omitted).

¹²³ *See also* Wilson & Fuchs, *supra* note 71.

of the social costs of attenuation of risk.”¹²⁴ And finally, the theory is of limited practical use in predicting public responses to potential sources of danger, because it lacks a comprehensive theory to predict specific factors and environments that contribute to public risk perception.¹²⁵

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 law makers and experts what they have been lacking, the ability to include the individual lay perspective in the decision-making equation.¹²⁶

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.¹²⁷ Because 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 having a model that could help determine risk preferences of members of the public in advance cannot be overstated.¹²⁸

III. FOCI OF EXISTING RISK PARADIGMS

¹²⁴ Rip questions the assumption that social amplification is necessarily problematic, as his title illustrates: *Should Social Amplification of Risk Be Counteracted?* 8, 2 RISK ANALYSIS 193 (1988).

¹²⁵ In advancing his claims, Sunstein draws on the theories of Fischhoff, Slovic, Beck, Kasperon, all of which are also discussed in this Article.

¹²⁶ See Appendix.

¹²⁷ See Dana, *supra* note 201 at 1328 (arguing that decision-makers are more likely to consider carefully the consequences of various risks when the public is involved in the conversation).

¹²⁸ Dan M. Kahan, Paul Slovic, Donald Braman, John Gastil, *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 Paul Slovic, Baruch Fischhoff, Sarah Lichtenstein, *Why Study Risk Perception?*, 2 RISK ANALYSIS 83, 83 (1982) (the question “how safe is safe enough?” appears to be [a] major policy issue); see also, Kuran & Sunstein, *supra* note 28, Fischhoff, Slovic, Lichtenstein, et al., *supra* note 31, at 127-52. (Citizens of modern industrial societies are presently learning a harsh and discomfiting lesson—that the benefits from technology must be paid for not only with money, but with lives...With increasing frequency, policy makers...have been turning to risk-benefit analysis...as the basic decision-making methodology for societal risk-taking.”).

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.¹²⁹ Another approach involves identifying which characteristics of hazards particularly likely to trigger fear or concern in an attempt to derive a “cognitive map” of risk perception from that data.¹³⁰ Another focus of research emphasizes the social component of risk perception, examining the dynamic nature of risk communication as information travels through public discourse.¹³¹ Yet another line of work focuses on the impact of cultural or sub-cultural factors on beliefs about risks.¹³² Each theoretical approach has provided a different emphasis; each has yielded valuable insights, and yet none is sufficient on its own. The various areas or issues emphasized by the different perspectives are discussed in general terms below. This 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.”¹³³ The notion 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.¹³⁴ RCT has not held up under close empirical scrutiny.¹³⁵ Social science

¹²⁹ See Fischhoff, Slovic, & Lichtenstein, *supra* note 31, at 128.

¹³⁰ See Slovic, PERCEPTION *supra* note 2, at 222.

¹³¹ See Kasperson, Renn, & Slovic et al., *supra* note 3, at 177.

¹³² 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, philosophical considerations about the value of a small number of lives versus conveniences benefiting society in general, and so on.

¹³³ 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 Herbert A. Simon, A Behavioral Model of Rational Choice, 69 Q.J. Econ. 99 (1955) and Herbert Simon, MODELS OF BOUNDED RATIONALITY, VOL. 2 (1982). Simon was a prolific scholar. Other of his important works in the area of bounded rationality include: Herbert A. Simon, Models of Man, Social and Rational: Mathematical Essays on Rational Human Behavior in a Social Setting 198-99 (1957); Herbert A. Simon, *Human Nature in Politics: The Dialogue of Psychology with Political Science*, 79 Am. Pol. Sci. Rev. 293 (1985).

¹³⁴ See generally, Thomas S. Ulen, *Rational Choice Theory*, in THE ENCYCLOPEDIA OF LAW AND ECONOMICS (Boudewijn Bouckaert & Gerrit De Geest, eds. 1996).

¹³⁵ See generally, Herbert A. Simon, *A Behavioral Model of Rational Choice*, 69 Q. J. ECON. 99 (1955) (for an early discussion of behavioral decision making); see also BEHAVIORAL LAW AND

research has revealed an extensive network of interrelated heuristics and biases that serve as the basis for much of human decision making.¹³⁶ 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 weight factors, and the tendency to be influenced by biased or irrelevant information.¹³⁷

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.¹³⁸ Eschewing rational 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.¹³⁹ Like other decision tasks, seeking information, analyzing the information, and determining the appropriate involves searching, storage, and retrieval of information, perception and reasoning.¹⁴⁰ 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 non-rational judgment formation because this type of decision-making often involves a high degree of uncertainty.

ECONOMICS (Cass 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).

¹³⁶ These heuristics and biases have been discussed 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.

¹³⁷ Decision-making using incomplete or imperfect information is an important feature of human functioning in the real world. Scholarship supporting this notion is abundant. Sometimes called behavioral decision theory, sometimes behavioral law and economics, 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, Sunstein & Thaler, *supra* note 65 at 1471 ("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?") (internal parentheses omitted).

¹³⁸ See Daniel Kahneman & Amos Tversky, *Choices, Values, and Frames*, 39 AM. PSYCHOLOGIST 341, 347-48 (1984) [hereinafter *Choices*]; Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision Under Risk*, 47 ECONOMETRICA 263, 263-91 (1979)[hereinafter *Prospect Theory*]; Daniel Kahneman & Amos Tversky, *Subjective Probability: A Judgment of Representativeness*, 3 COGNITIVE PSYCHOL. 430, 430 (1972). For some early law review pieces discussing heuristical processing and responses in legal frameworks, see Kelman et al., *supra* note , at 1436-42.(discussing the availability and representative heuristics); see also, Underwood, *supra* note . ("[S]tudies 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.").

¹³⁹ *Id.*

¹⁴⁰ See Peter M. Todd & Gerd Gigerenzer, *What We Have Learned so Far*, in SIMPLE HEURISTICS THAT MAKE US SMART 3, 5 (Gerd Gigerenzer, Peter M. Todd & ABC Research Group, eds., Oxford University Press 1999) (showing how building blocks control information search, stop search, and make decisions that can be put together to form classes of heuristics).

Moreover, information about risks is particularly well-suited to exploitation by motivated actors.¹⁴¹ 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 have been considered specifically in the risk perception context, often to demonstrate a systematic lack of rationality in how individual members of the public respond to potential dangers.¹⁴²

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.¹⁴³ Some commentators opine that the growth in the number of communication forms have contributed to the advent of the “risk culture” of today. According to David Altheide,

[F]ear 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.¹⁴⁴

Differences in how members of the public receive information about risks mean that there are more possible sources of “input.” It also means that there is more potential for these sources to interact and amplify or attenuate perceptions

¹⁴¹ 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 features of human decision-making—particularly with respect to product-related risks—can be exploited for financial gain).

¹⁴² See generally, Slovic, PERCEPTION *supra* note 2; see also generally, Cohl, *supra* note; Barry Glassner, THE CULTURE OF FEAR: WHY AMERICANS ARE AFRAID OF THE WRONG THINGS (2000).

¹⁴³ See William Leiss, *Three Phases in the Evolution of Risk Communication Practice*, 545 Annals of the American Academy of Political and Social Science 85-94 (1996) (tracking the evolution of risk communication during the last twenty years.) See generally, Baruch Fischhoff, *Risk Perception and Communication Unplugged: Twenty Years of Process* 15, 2 Risk Analysis 137-45 (1995) (identifying a series of 7 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.

¹⁴⁴ Altheide, *supra* note 13, at 664

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 on-line news stories, to individuals expressing views via blogs or in chat rooms, to official reports issued by the National Institutes of Health.¹⁴⁵ Depending upon which sites she reads, she will be comforted or increasingly concerned.¹⁴⁶ The story is 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.¹⁴⁷ Many of the writings available on risk communication have been composed with the purpose of providing investigators, political leaders, and agency administrators with strategic guidance regarding effective risk communication. Another broad area of research has studied the impact of the media on how members of society view risks.¹⁴⁸ Finally, research on the influence of heuristics and biases has revealed the importance of features of the communication context for resulting risk perception.¹⁴⁹ 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*

¹⁴⁵ For examples of a variety of sources of information, see <http://www.seattlepi.com/national/case22.shtml>; report.nih.gov/award/trends/InstInfoExcel.cfm?OrgID=6218701&Year=2008 (for an NIH report); <http://www.organicconsumers.org/Toxic/hormoncancer.cfm> (for a source promoting organic products); <http://www.thebeefsite.com/articles/1734/the-big-question-over-beef-hormones> (*last visited*, Mar. 23, 2010).

¹⁴⁶ For more examples, see <http://www.sustainabletable.org/issues/hormones/>; Janice Castro, Cristina Garcia, & Adam Zagorini, *Why The Beef Over Hormones?*, TIME, Jan. 16, 1989, <http://www.time.com/time/magazine/article/0,9171,956754,00.html>; Samuel S. Epstein, *Hormones in U.S. Beef Linked to Increased Cancer Risk*, THE HUFFINGTON POST, Nov. 6, 2009, <http://world-wire.com/news/0910210001.html>; <http://www.beefmyths.org/beefmyths/cattlegrowthhormones/> (*last visited* June 10, 2010).

¹⁴⁷ See e.g., Lee Thomas' remark, "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." *Effective Risk Communication: The Role of Responsibility of Government and Nongovernment Organizations*, (in Covello, V. T., McCallum, D. B., & Pavlova, M. T. eds., 1989).

¹⁴⁸ Altheide, *supra* note 13, at 664; see also, Anders Wahlberg & Lennart Sjöberg, *Risk Perception in the Media*, 3 Journal of Risk Research 31, 31-50 (2000).

¹⁴⁹ Kasperson, Renn, Slovic, et al. *supra* note 4, at 178; see also, Paul Slovic, *Perception II supra* note 8 at 280; see also, C.A. Vlek & P. J. M. Stallen, *Judging Risks and Benefits in the Small and the Large*, 28 Org. Behav. & Human Performance (1981).

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 menacing it with an endless series of hobgoblins, all of them imaginary.”¹⁵⁰ 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.”¹⁵¹ The term “availability entrepreneur” connotes a particular ideological slant or “pet cause.” In this Article, the term *facilitator* is used 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.¹⁵²

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 to be publicized.¹⁵³ Facilitators commonly frame issues in a manner that makes the danger appear to be particularly imminent and destructive.¹⁵⁴ Often there will be a battle between facilitators with opposing agendas, and the dangers inherent in one risk will be played up in defense of other potential hazards.¹⁵⁵ 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

It is possible to think about the risks we face on two different levels: the micro (individual hazard) level and the macro (general fear of hazards) level.¹⁵⁶ On the one hand, one might consider risk perception as it pertains to 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

¹⁵⁰ H. L. Mencken, IN DEFENSE OF WOMEN 29 (1922).

¹⁵¹ See Kuran & Sunstein, *supra* note 28, at 703.

¹⁵² The media is discussed at length in Section IV.

¹⁵³ Kasperson, Renn, Slovic, et al. *supra* note 4, 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 also Wilson & Fuchs, *supra* note 71.

¹⁵⁴ See Slovic, PERCEPTION *supra* note 2 at 9.

¹⁵⁵ Beck, *supra* note 9, at 31.

¹⁵⁶ Wahlberg & Sjöberg, *supra* note 127, at 37.

innocuous.¹⁵⁷ Psychometric risk researchers seek to explain differences in attitudes about various type of potential hazards as well as identifying which potential risks cause the most concern, and why.¹⁵⁸ 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.¹⁵⁹ Pressures to implement new technologies, and the potential for financial gain mean that manufactures and developers may downplay the potential for harm or may curtail research efforts.¹⁶⁰ Threats to health and well-being from new products and processes may be difficult to assess, even with substantial research findings.¹⁶¹ 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.¹⁶²

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.¹⁶³ The psychometric study of risk has also included attempts to determine which characteristics of a hazard or hazard situation are likely to trigger concern.¹⁶⁴ A number of empirical investigations of risk preference have revealed some reliable patterns of "public" (as opposed to expert) risk perception. For example, risks assumed involuntarily, and those that are associated with unfamiliar sources and have potentially catastrophic consequences (such as risks posed by nuclear energy) are particularly feared,¹⁶⁵ whereas risks associated with familiar activities where the potential for harm is

¹⁵⁷ Some examples are nuclear waste (high) automobile use (low) terrorism (high) global warming (changing).

¹⁵⁸ Fischhoff, Slovic, & Lichtenstein, *supra* note 31, at 128.

¹⁵⁹ See Slovic, *Perception II supra* note 8 at 280.

¹⁶⁰ See Dorothy Nelkin, *Communicating Technological Risk: The Social Construction of Risk Perception*, 10 Annual Review of Public Health 95, 96 (1989)(reviews the issues involved in communicating risk to the public)

¹⁶¹ See also, Kasperson & Kasperson, *supra* note 18, at 96.

The familiar scourges of famine, disease, and pestilence no longer contaminate 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 part of the globe, and harms arising from the flow and control of information.

¹⁶² Beck, *supra* note , at 19 (1992) ("Atomic accidents are accidents no more in the limited sense of the word 'accident.' They outlast generations.") *Id.* (internal parenthetical omitted.)

¹⁶³ *Id.*

¹⁶⁴ For the arguable 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).

¹⁶⁵ See generally, Kasperson, Renn, Slovic, et al. *supra* note 4 ; Slovic, PERCEPTION *supra* note 2; Kasperson & Kasperson, *supra* note 18; Fischhoff, Slovic, Lichtenstein, et al., *supra* note 31.

“localized” and where the risk is voluntarily assumed, are generally characterized as less threatening.¹⁶⁶ 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 non-experts, so-called “average citizens.”¹⁶⁷ 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 thought of as 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 the risk is perceived. A stakeholder can be expected to experience more emotion with respect to a risk when that risk is self-relevant.¹⁶⁸ 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.¹⁶⁹ To the extent that emotions are heightened in stakeholders, existing predilections will be exaggerated.¹⁷⁰ Interestingly however, respondents avoid characterizing themselves as

¹⁶⁶ See generally, Slovic, *Perception II supra* note 8; Kasperson, Renn, Slovic, et al. *supra* note 4; Slovic, *PERCEPTION supra* note 2; Fischhoff, Slovic, Lichtenstein, et al., *supra* note 31.

¹⁶⁷ See Slovic, *supra* note , (“[Traditional] risk analysis is distinctly “expert-centered” and uncomfortable with (or even hostile to) considering the views of diverse, nonexpert parties. It is also uncomfortable with a broadly multidimensional view of risk. In contrast, and in the spirit of the arguments in this paper, decision analysis seeks out the diverse views of interested and affected stakeholders.”)

¹⁶⁸ 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.)

¹⁶⁹ Jennifer S. Lerner, Roxana M. Gonzalez, Deborah A. Small, Baruch Fischhoff, *Effects of Fear and Anger on Perceived Risks of Terrorism*, 14 Psychological Science 144, 148 (2003) (“Experiencing more anger triggered more optimistic beliefs; experiencing more fear triggered greater pessimism.”)

¹⁷⁰ Kahan, *supra* note 82 (“. . . perceptions of danger naturally feed upon one another among persons who share cultural commitments. This form of group polarization 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 citations omitted).

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 they are to see themselves as potential victims.¹⁷¹

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 U.S. 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.¹⁷² 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?”¹⁷³ 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 government to adequately respond to the needs of its citizens.¹⁷⁴ 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 will become evident in Section IV.¹⁷⁵

2. Language as a Product of Culture.

¹⁷¹ Lerner, Gonzalez, Small, & Fischhoff, *supra* note , at 149. 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. This tendency is related to the optimism bias, the tendency to attribute superior traits to oneself and to predict positive outcomes for one’s own future. See Lauri 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); K. Patricia Cross, *Not Can, But Will College Teaching Improve?*, *New Directions for Higher Educ.*, Spring 1977, at 1, 4 (citing a study indicating that ninety-four percent of college professors think that their work is above average); 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).

¹⁷² 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)(“individuals expect protection from the state For the government itself to cause harm adds an element of outrage generally not present in purely private wrongdoing.” (citing Dinah Shelton, *Remedies in International Human Rights Law* 50 (Oxford University Press 1999)).

¹⁷³ LOIS MARIE GIBBS, *LOVE CANAL* 1 (State of New York Press 1982)

¹⁷⁴ See Russel S. Sobel & Peter T. Leeson, *Government’s Response to Hurricane Katrina: A Public Choice Analysis*, 127 Public 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 ((citing the desire for change sparked by “the outrage over the abandonment of people of color during Hurricane Katrina. . .”)

¹⁷⁵ See Section III, *infra*

The term “cultural factors” includes a complex set of considerations relating to the characteristics of a population that is influenced by shared patterns of behaviors and interactions, cognitive constructs, and affective understanding learned through socialization within a particular group of people.¹⁷⁶ 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.¹⁷⁷

Language is a critical factor in how individuals understand risk.¹⁷⁸ Language is more than the medium through which probabilities about outcomes is conveyed; it 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 that can be quite powerful.¹⁷⁹ Semantics contribute to risk perception in powerful ways, particularly when language is emotive.¹⁸⁰ Alternatively, language is used to minimize the seriousness of a situation or to rob an issue of its emotional content.¹⁸¹ For example, it has been argued that advocates of the death penalty have

¹⁷⁶ The term “culture” has comprised 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).

¹⁷⁷ See e.g., G. Hofstede, *National Cultures and Corporate Cultures*. in *COMMUNICATION BETWEEN CULTURES* 51 (L.A. Samovar & R.E. Porter, eds., 1984) (“Culture is the collective programming of the mind which distinguishes the members of one category of people from another.”); see also, J. A. Banks & C.A. McGee, *MULTICULTURAL EDUCATION* (1989) (“Most social scientists today view culture as consisting primarily of the symbolic, ideational, and intangible aspects of human societies. The essence of a culture is not its artifacts, tools, or other tangible cultural elements but how the members of the group interpret, use, and perceive them. It is the values, symbols, interpretations, and perspectives that distinguish one people from another in modernized societies; it is not material objects and other tangible aspects of human societies. People within a culture usually interpret the meaning of symbols, artifacts, and behaviors in the same or in similar ways.”); see also, J.P. Lederach, *PREPARING FOR PEACE: CONFLICT TRANSFORMATION ACROSS CULTURES* (1995) (“Culture is the shared knowledge and schemes created by a set of people for perceiving, interpreting, expressing, and responding to the social realities around them.”)

¹⁷⁸ See Nelkin, *supra* note , at 95. (discussing “the complex and controversial process of evaluating the hazards of technologies, communicating information about potential risks, and developing appropriate controls”).

¹⁷⁹ Moeller, Susan (2007-06-21). "Jumping on the US Bandwagon for a "War on Terror"". Yale Global Online. Yale Center for the Study of Globalization. <http://yaleglobal.yale.edu/display.article?id=9324> (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).

¹⁸⁰ Patricia Greenspan, *Emotions, Rationality, and Mind/Body* (2001)(draft on file with author)(“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.”)

¹⁸¹ See Cass R. Sunstein, *On the Divergent American Reactions to Terrorism and Climate Change*, 107 Colum. L. Rev. 503, 534 (2007)[Hereinafter Sunstein, *American Reactions*] (“White House

developed “sterile” or “medical” terms for the procedure by which a death sentence is administered in order to mask the distasteful and frightening reality.¹⁸² 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.¹⁸³ 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 protector.¹⁸⁴ 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 a particular neighborhood or locale.¹⁸⁵ 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 PTO 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.¹⁸⁶ Group polarization occurs in the context of risk perception as well. Accordingly,

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).

¹⁸² An example is a typical description of the procedure used to administer the death sentence.

¹⁸³ One example of a campaign that used rhetoric and imagery in this way arose out of an effort to get women to breastfeed their infants. Joan B. Wolf, *Is Breast Really Best? Risk and Total Motherhood in the National Breastfeeding Awareness Campaign*, 32 *Journal of Health Politics, Policy and Law* 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.”)

¹⁸⁴ See Rebecca Kukla, *Ethics and Ideology in Breastfeeding Campaigns*, 21 *HYPATIA* 157-180 (2006); See also, Orit Avishai, *Managing The Lactating Body: The Breast-Feeding Project and Privileged Motherhood*, 30 *QUALITATIVE SOCIOLOGY* 135-152 (2007).

¹⁸⁵ See Dora C. Lau, J. Keith Murnighan, *Demographic Diversity and Faultlines: The Compositional Dynamics of Organizational Groups*, 23 *ACAD. OF MGMT. REV.* 325, 326, 329 (1998) (explaining that faultlines are hypothetical dividing lines that may split a group into subgroups based on attributes such as age, personal values, personality, race, job status).

¹⁸⁶ Molly J. Walker Wilson, *Behavioral Decision Theory and Implications for the Supreme Court’s Campaign Finance Jurisprudence*, 31 *CARDOZO L. REV.* 679 (2010). (“When groups of like-minded individuals discuss issues, their views become more entrenched, and they are less likely to be open to new or different ideas.”).

“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.¹⁸⁷ So too, a group of people who tend to think that the risks of global warming have been exaggerated will tend to think, after discussion, that global warming is no cause for concern.”¹⁸⁸ Group polarization is related to a related concept called affiliation bias, whereby experts tend to interpret scientific findings in a manner that benefits their employers.¹⁸⁹ The inclination to gravitate toward the view of other members of a group is called affiliation bias¹⁹⁰, and has been offered as evidence of irrationality in human decision-making, although the evolutionary advantage of this tendency is clear, given that humans are social animals that 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: Temporal and Contextual 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 or the same as “culture”. For example, one aspect of the risk “context” in western societies is our system of food production.¹⁹¹ 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

¹⁸⁷ See 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); see also, Cass R. Sunstein, *RISK AND REASON: SAFETY, LAW, AND THE ENVIRONMENT*, 89, 96) (2002) (stating that “if members of a group tend to be concerned about global warming, pesticides causing cancer, . . . and secondhand smoke . . . they will tend to have a heightened fear of these things.”).

¹⁸⁸ See Sunstein, *LAWS OF FEAR*, *supra* note 95.

¹⁸⁹ Slovic, *PERCEPTION* *supra* note 2 at 311.

¹⁹⁰ *Id.* at 311-13.

¹⁹¹ See Ting-Tooney Gudykunst, *CULTURE AND INTERPERSONAL COMMUNICATION*, 30 (1988) (The definition of “culture” is a debated issue, and has been given many different definitions in the literature, including “a script or schema shared by a large group of people.”); see also, *SURVEY OF SOCIAL SCIENCE(SOCIOLOGY)*(Frank N. Magill ed., 1994) ([Culture is] “complex patterns of living developed by humans and passed down through the generations”); see also, *A DICTIONARY OF SOCIOLOGY*.45 (G. Duncan Mitchell ed., Routledge & Kegan Paul 1979) (Culture is defined by “that part of the total repertoire of human action (and its products), which is socially as opposed to genetically transmitted.”); and see Allan G. Johnson, *THE BLACKWELL DICTIONARY OF SOCIOLOGY* 74 (2000)(“the accumulated store of symbols, ideas, and material products associated with a social system, whether it be an entire society or a family is one of the major key elements of every social system and a key concept in defining the sociological perspective.”)

the population, while simultaneously introducing heretofore unknown risks.¹⁹² Technologies exert pressures on culture; cultures are shaped by technologies. And technologies are, to a large extent, supported or stifled by cultural beliefs.¹⁹³ 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.¹⁹⁴

Technology can also interact with geography with interesting results. In the modern, post-industrial 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.¹⁹⁵ Some risks are geographically localized, and others defy geography and pose dangers to the entire global environment and all who inhabit it.¹⁹⁶ 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 discovery of a new health threat is revealed following the publication of a scientific study.¹⁹⁷ Following an environmental disaster, the

¹⁹² See Beck, *supra* note 9, at 19 (1992) (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.”) *Id.*

¹⁹³ See Roger Roots, *The Dangers of Automobile Travel A Reconsideration*, 66 AM. J. OF ECON. AND 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* (Washburn University) (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).

¹⁹⁴ See Kasperson, Renn, Slovic, et al. *supra* note 4, at 178 (“Risk is a bellwether in social decisions about technologies”)

¹⁹⁵ *Pollution Travels the Globe, Study Confirms*, LiveScience Sept. 29, 2009 (found at: <http://www.livescience.com/environment/090929-foreign-pollution.html>, last visited, July 26, 2010); *Satellite Measures Pollution From East Asia to North America* NASA March, 2008 (found at <http://geology.com/nasa/monitoring-pollution-by-satellite.shtml>, last visited, July 26, 2010) ; Michael Reilly, *Air Pollution Travels, Kills Thousands Annually* Discovery News (found at <http://dsc.discovery.com/news/2009/08/14/air-pollution-overseas.html> (last visited July 26, 2010).

¹⁹⁶ See Beck, *supra* note 9, at 27 (1992) (citing DDT found in arctic penguins as an example of the globalization of risk).

¹⁹⁷ 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 The National Toxicology Program U.S. Department of Health and Human Services NTP-CERHR, *Monograph on the Potential Human Reproductive and Developmental Effects of Bisphenol A Center For The Evaluation of Risks To Human Reproduction September 2008* NIH Publication No. 08 – 5994. For some examples of the types of events that can trigger communication about risk, see *See also*, Kasperson & Kasperson, *supra* note 18, at 96.

government, the media, and public interest groups may all communicate information about the event.¹⁹⁸ How the “first-line receivers” interpret and subsequently communicate this information influences perceptions of targets multiple iterations removed.¹⁹⁹ 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 non-government organizations and agencies have enormous influence in filtering information for public consumption.²⁰⁰

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.²⁰¹ As empirical studies have revealed, “attitudes need not be related to behaviors,²⁰² and even if they are, they may be trailing rather than leading indicators. Indeed, psychology's self-perception theory tracks the ways in which people infer their

¹⁹⁸ The public outrage and concern following the Exxon Valdees 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. See also Wilson & Fuchs, *supra* note 71, at 153-159.

¹⁹⁹ Kasperson, Renn, Slovic, et al. *supra* note 4, at 180.

²⁰⁰ For a discussion of 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* 19 (Covello, V. T., McCallum, D. B, and Pavlova, M. T. eds., 1987)(“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.”)

²⁰¹ See Cass R. Sunstein, *Deliberative Trouble? Why Groups Go to Extremes*, 110 YALE L.J. 71, 86-88 (showing 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 Latane, *Bystander Intervention in Emergencies: Diffusion of Responsibility*, 8 J. PERSONALITY AND 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 people from assisting in what they believe to be emergencies); See also, Rob Bond, Peter B. Smith, *Culture and Conformity: A Meta-Analysis of Studies Using Asch’s (1952b, 1956) Line Judgment Task*, 119 PSYCHOLOGICAL BULLETIN 111, 111-37 (1996)(analyzing 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); see also, Stanley Milgram, *Behavioral Study of Obedience*, 67 J. ABNORMAL AND SOC. PSYCHOL. 371, 371-78 (1963) (demonstrating that despite an unwillingness to continue experiment and a belief that real harm was being done, subjects continued to be obedient to experimenter over these beliefs); see also, Irving L. Janis, *Groupthink*, PSYCHOLOGY TODAY MAGAZINE, 1971, at 84. (showing that individual beliefs and concerns may be cognitively ignored in situations where group cohesion and cooperation is more highly desired, leading to adverse consequences).

²⁰² Bond & Smith, *supra* note, at 111-37 (citing an experiment in which participants were asked to judge which line was longer after confederates had incorrectly stated their opinions. In many situations the subjects conformed to the group’s incorrect statements, despite looking directly at the lines).

attitudes from their behavior ('If I'm doing this, it must be because I like it').²⁰³ Whether members of the public take certain steps that would reasonably be predicted based upon 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, often individuals act on *other* people's perceptions—or at least champion the “common wisdom,” independent of their own private attitudes.²⁰⁴ 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.²⁰⁵ The former is an area where risk perception *can* (although it often doesn't) directly influence exposure to a potential hazard. The latter is influenced by public risk perception 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.²⁰⁶ 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 fail to protect) its citizens. A well-functioning democracy, on the other hand, should be responsive to the wishes and needs of the populace.²⁰⁷ In the context of this type of political environment, public perception often—for good or for ill—impacts policy adoption.²⁰⁸ 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

²⁰³ Baruch Fischhoff & Ilya Fischhoff, *Will They Hate Us? Anticipating Unacceptable Risks* 3 Risk Management, 7, 11 (2001). *See also*, Daryl J. Bem, *Self Perception Theory*, in 6 *Advances in Experimental Social Psychology* 1-574 (Leonard Berkowitz 1979); *See also*, Russel H. Fazio, *Self-Perception Theory: A Current Perspective*, in 5 *SOCIAL INFLUENCE: Ontario Symposium* 129 (Mark P. Zanna, James M. Olson, & C. Peter Herman eds. 1987); *see also*, Daryl J. Bem, *Self-Perception: An Alternative Interpretation of Cognitive Dissonance Phenomena*, 74 *PSYCHOL. REV.* 183, 183-200 (1967); *see also*, Walter B. Cannon, *The James-Lange Theory of Emotions: A Critical Examination and an Alternative Theory*, 100 *American Journal of Psychology* 567, 567-86 (1987) (emotions follow physical reactions, i.e., because my body is crying I must be sad).

²⁰⁴ *See generally*, Sunstein, *LAWS OF FEAR*, *supra* note 95 at 67.

²⁰⁵ *See* Mason, *supra* note 179, 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 next available information.”)

²⁰⁶ *See generally*, Wilson & Fuchs, *supra* note 71.

²⁰⁷ THE DECLARATION OF INDEPENDENCE para. 2 (U.S. 1776) (stating “. . . 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 principle and organizing its powers in such form, as to them shall seem most likely to effect their safety and happiness . . .”)

²⁰⁸ *See* James Forman, Jr., *Why Care About Mass Incarceration?*, 108 *MICH. L. REV.* 993 (2010) (despite failure of 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 172, (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).

genuine democracy, the translation of public belief to political action is imperfect, of course. For one thing, democratic governments are rarely characterized as “efficient” law-making structures.²⁰⁹ For another, policy makers are influenced by the same variables as other members of society, and may be guided by a separate, if related set of biases.²¹⁰ 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.²¹¹ But to say this is not to suggest that the risk preferences of members of the population are routinely considered when risk decisions are made. 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 a particularly bad policy decision results in public outrage.²¹² The role of individual members of society need not 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 goes far in achieving insight into this area, but is not exhaustive.²¹³ Risk is a sufficiently ubiquitous phenomenon that relevant inputs are almost endless, and theories regarding

²⁰⁹ Forman, *supra* note 187, at 993. (public policy influenced by majority for election purposes leading to bad outcomes); Cynthia L. Fountaine, *Lousy Lawmaking: Questioning the Desirability and Constitutionality of Legislating by Initiative*, 61 S. CAL. L. REV. 733, 733 (1988) (democracy 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 Whitford, Andrew B. and Lee, Soo-Young, *The Efficiency and Inefficiency of Democracy in Making Governments Effective: Cross-National Evidence* (2009). APSA 2009 Toronto Meeting Paper. Available at SSRN: <http://ssrn.com/abstract=1450743> (democracy may be inefficient for countries suffering from the “dictator/disorder” dilemma).

²¹⁰ See W. Kip Viscusi, *FATAL TRADEOFFS: PUBLIC AND PRIVATE RESPONSIBILITIES FOR RISK* (Oxford 1992).

²¹¹ See Khan, *supra* note 172 (explaining that public policies often made to satisfy voters or unhappy sects rather than by sound logic and empirical evidence); See also Forman, *supra* note 187, at 993; 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 lawmakers are influenced by public sentiment).

²¹² 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 80% 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 Hurricanes and Rising Seas 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*, PBS, *Public Opinion After Katrina* (Wednesday, August 25) (“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.”)

²¹³ See Appendix.

foundations and sources of concern are constantly evolving.²¹⁴ 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.²¹⁵ The public has a broad concept of risk that incorporates a wide variety of considerations.²¹⁶ 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.²¹⁷ 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 when the public will become alarmed. At this stage of the project, these factors are listed. Their relative strength and level of influence of these factors is variable, and unquestionably depend upon the unique combination of factors making up the interaction in any given situation.²¹⁸ 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. Specifically, having a specific set of predictors can assist government officials in predicting when widespread concern will arise and in managing public risk responses.

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

²¹⁴ Fischhoff, Slovic, Lichtenstein, et al., *supra* note 31, at 128. (discussing two different risk approaches to a single risk analysis; whether a product is reasonably safe).

²¹⁵ See generally, Robert E. O'Connor, Richard J. Bard, & Ann Fisher, *Risk Perceptions, General Environmental Beliefs, and Willingness to Address Climate Change*, 19 *Risk Anal.*, 461 (2006) (discovering a complicated relationship between individuals' general environmental beliefs and their willingness to advocate for prevention in the area of climate change).

²¹⁶ is possibly redundant to cite, since it was cited in the prior sentence in different wording

²¹⁷ See generally, Slovic *supra* note 35,

²¹⁸ Results from some studies demonstrate sensitivity to context and covarying features that increases the difficulty in making detailed global predictions. See e.g., M.G. Morgan, Baruch Fischhoff, B., A. Bostrom, & C. Atman, *RISK COMMUNICATION: THE MENTAL MODELS APPROACH* (2001).

related to hazards reach a broad segment of society.²¹⁹ Priming describes the phenomenon whereby exposure to a stimulus influences the response to a later stimulus.²²⁰ Certain primes or triggers can help to determine cognitive and affective—or emotion-base— reactions to later targets or events.²²¹ In risk perception terms, early experiences influence subsequent reactions to potential hazards.²²² 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.²²³ Priming has been discussed in terms of both cognitions and emotions. Social psychologists have coined the phrase “cognitive priming” to describe the process whereby one idea or practice becomes associated with other ideas or practices.²²⁴ 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 fear is induced.²²⁵

In the risk perception literature, priming of risk has been discussed as “signaling.” Risk researchers have suggested that to the degree that an event is associated with a risk, that event can act as an important signal.²²⁶ Paul Slovic cites the disaster at Three Mile Island (TMI) as a striking example of an event

²¹⁹ For example, although personal exposures vary, Americans share the common experiences of Three Mile Island, the attacks of September 11 2001, and Hurricane Katrina. 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.

²²⁰ See Cialdini, Reno, & Kallgren, *supra* note 90, at 1023. (“priming 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”).

²²¹ S.T. Murphy & Robert B. Lajonc, *Affect, Cognition, and Awareness: Affective Priming with Optimal and Suboptimal Stimulus Exposures*, 64 *J. Person. Soc. Psych.* 723, 723 (1993) (finding that millisecond-long encounters with negative or positive stimuli can produce non-specific emotional reactions to unrelated stimuli).

²²² Fear has been empirically linked to priming effects wherein the salience of an earlier event influences or “primes” future perception of risks. For an example of this phenomenon 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, 434-437 (Anne O. Krueger ed., 1996).

²²³ See generally, D. A. Sherman et al., *AFFECTIVE PERSEVERANCE: COGNITIONS CHANGE BUT PREFERENCES STAY THE SAME* (1998). See also, Paul Slovic, *Rational Actors and Rational Fools: The Influence of Affect on Judgment and Decision-Making*, 1 *Roger Williams L. Rev.* 172 (2000) (hereinafter Slovic, *Rational Actors*) (discussing the perseverance of induced preferences).

²²⁴ See Cialdini, Reno, & Kallgren, *supra* note 90, at 1015. (describing the influence of observed behavior in inducing like behavior).

²²⁵ See Slovic, *Rational Actors*, *supra* note 220 at 172 (discussing studies demonstrating the role of affect in the formation of preference). See also, Sherman et al., *supra* note; Robert B. Zajonc, *Feeling and Thinking: Closing the Debate Over the Independence of Affect*, in *FEELING & 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).

²²⁶ See Fischhoff, Slovic, Lichtenstein, et al., *supra* note 31 at 9.

with high signal potential.²²⁷ TMI did not result in any loss of human life, yet the impact of the accident was monumental.²²⁸ Widespread public fear and outrage occurred following the incident, resulting in serious consequences for the utility plant involved as well as increased regulations on the nuclear energy industry.²²⁹ 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.²³⁰

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. However, the reaction to hazardous discoveries and events can be complex. As Slovic points out:

²²⁷ Slovic, *Perception II supra* note 8, at 283. *See also generally*, Kasperson, Renn, Slovic, et al. *supra* note 4 .

²²⁸ The Washington Post has described the accident and the aftermath:

Before the 1979 accident at Pennsylvania's Three Mile Island, few had heard of the nuclear power plant on the Susquehanna River. But the crisis that began . . . in the early morning of March 28 quickly turned the plant and its giant cooling towers into icons in the long national argument over the safety of nuclear energy.

The initial information from the accident in the Unit 2 reactor was sketchy and contradictory. The utility company that ran the plant said the situation was manageable. But officials from mayor's offices to the Oval Office worried about possible complications that would shower radioactivity on the small communities around Three Mile Island – or perhaps even farther. Government engineers feared that the reactor's nuclear fuel would melt out of its thick steel and cement encasement, or that a hydrogen gas bubble in the core would explode.

In Harrisburg, less than 10 miles away, the state's new governor struggled with conflicting advice on whether to begin an evacuation that might affect more than 600,000 people. In Washington, 100 miles south, federal regulators anxiously sought reliable information to guide local authorities and the president, former nuclear engineer Jimmy Carter.

In the two decades since Three Mile Island, the plant has become a rallying symbol for the anti-nuclear movement. But the nuclear power industry, which has not built a single new plant in the United States since 1979, says the accident showed that its safety systems worked, even in the most extreme circumstances.

Revelations during the decade-long cleanup of the crippled reactor showed that its core was more seriously damaged than originally suspected. But scientists still disagree on whether the radiation vented during the event was enough to affect the health of those who lived near the plant.

20 Years Later: A Nuclear Nightmare in Pennsylvania The Washington Post, Mark Stencel, March 27, 1999 (found at: <http://www.washingtonpost.com/wp-srv/national/longterm/tmi/tmi.htm>) (last visited, July 10, 2009).

²²⁹ Slovic, *Perception II supra* note 8, at 283.

²³⁰ *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 . . .” Three Mile Island, *Columb. Encyclopedia*, Sixth Edition. (2008) (<http://www.encyclopedia.com/doc/1E1-ThreeMil.html>) (last visited, July 10, 2009).

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 an immense social consequences if it is perceived as a harbinger of further and possibly catastrophic mishaps.²³¹

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 determine whether an incident will prime or signal the population, creating lasting attitudes about certain classes of activities.

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 images of destruction.²³² 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 be focused 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.²³³ Empirical work using survey materials have asked respondents to rank or rate activities for their riskiness and have 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.²³⁴ For

²³¹ Slovic, *Perception II supra* note 8 at 283.

²³² 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., www.september11news.com/AttackImages.htm; <http://www.time.com/time/photoessays/shattered/>; <http://revver.com/video/59686/september-11-2001-what-we-saw/> (all last visited, Mar. 10, 2010).

²³³ Empirical work on risk characteristics is referred to, collectively, as the psychometric study of risk perception. See Section I *supra*.

²³⁴ See Slovic, *Perception II supra* note 8 at 280.

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.²³⁵ Later surveys expanded the survey to add dimensions and revised the methodology.

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 triggered by the harm.²³⁶ 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.”²³⁷ 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 (sic), catastrophic, fatal rather than injurious, not offset by compensating benefits, and delayed in time so the risks are borne by future generations.”²³⁸ Slovic and his colleagues have grouped risk features into two broader categories: the dread risk factor and the unknown risk factor.²³⁹ 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 the risk is judged to have catastrophic effects.²⁴⁰ The dread factor is directly related to the role of affect in risk perception, which is discussed 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.²⁴¹ Several of these key characteristics of risks merit a more detailed discussion.²⁴²

1. Controllability

²³⁵ See Fischhoff, Slovic, Lichtenstein, et al., *supra* note 31 at 9.

²³⁶ See Slovic, *Perception II supra* note 8 at 282.

²³⁷ See Fischhoff, Slovic, & Lichtenstein, *supra* note 31.

²³⁸ Slovic, *PERCEPTION supra* note 2 at 190.

²³⁹ Slovic's work, in particular, identified two main cognitive factors which dominate individuals' perception of risk. See generally, Slovic, *PERCEPTION supra* note 2.

²⁴⁰ Slovic, *PERCEPTION supra* note, 2 at 1997 (“A risk is dreaded to the extent it is perceived to be uncontrollable, involuntary and potentially catastrophic in its consequences.”)

²⁴¹ See Slovic, *Perception II supra* note 8 at 281-83..

²⁴² The 1978 Fischhoff et al. 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 great dread for-on the level of a gut reaction?”); 9. Severity of consequences (“How likely is it that the consequence will be fatal?”). See Fischhoff, Slovic, Lichtenstein, et al., *supra* note 31 at 130.

The feeling of control is an important influence on human behavior.²⁴³ When individuals perceive that they have control over events, they experience less fear.²⁴⁴ Conversely, risks over which people perceive that they have little influence are likely to be viewed as more dangerous and less acceptable.²⁴⁵ Examples of uncontrollable hazards include airplane crashes, dangers from electric power, and harms from transport of hazardous materials.²⁴⁶ As Slovic 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’)”²⁴⁷ In sum, “perceived lack of control is a key factor behind high risk perception . . .”²⁴⁸

The control issue becomes important in particular contexts.²⁴⁹ Environment and technology risks tend to be seen as not under one’s control. These types of hazards are viewed as primarily the responsibility of the government.²⁵⁰ Lifestyle risks, on the other hand, are judged to be a matter of personal responsibility.²⁵¹ Risk perception can also vary, depending upon who is surveyed. 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.²⁵²

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).²⁵³ This fact illustrates the principle that familiarity with a given risk mediates public fear and judgments about the appropriate public response to the hazard.²⁵⁴ The “unknown” risk factor includes characteristics such as known–unknown to the individual, known–unknown to science, and new–old.²⁵⁵

²⁴³ George Loewenstein, *Out of Control: Visceral Influences on Behavior*, 65 *Organizational Behav. & Hum. Decision Processes* 272, 274 (1996)

²⁴⁴ Slovic, *Perception II supra* note 8 at 283. (“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”)

²⁴⁵ Slovic, *Perception II supra* note 8 at 282. (example of psychometric data)

²⁴⁶ Loewenstein, *supra* note , at 274.

²⁴⁷ Paul Slovic et al., *Behavioral Decision Theory Perspectives on Protective Behavior, in Taking Care: Understanding and Encouraging Self-Protective Behavior* 14 (Neil D. Weinstein ed., 1987).

²⁴⁸ Slovic, *PERCEPTION supra* note 2 at 988.

²⁴⁹ Lennart Sjöberg, *The Different Dynamics of Personal and General Risk*, *Risk Management*, 19, 27 (2003)[hereinafter Sjöberg, *Different Dynamics*].

²⁵⁰ *Id.* at 19-34.

²⁵¹ *Id.*, at 31.

²⁵² Slovic, *supra* note 35, at 59 (Explaining less risk aversion in white males versus non-white males and women this way: “Perhaps white males see less risk in the world because they create, manage, control, and benefit from many of the major technologies and activities.”)

²⁵³ Frank Baker, *Risk Communication about Environmental Hazards* 11 *J. of Pub. Health Pol.*, 341, 346 (1990).

²⁵⁴ Kasperson, Renn, Slovic, et al. *supra* note 4 , at 178.

²⁵⁵ Slovic, *Perception II supra* note 8 at 280.

Familiarity has been linked to affective components of risk perception, such as dread—or more informally—fear and anxiety.²⁵⁶ 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.²⁵⁷ 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.²⁵⁸ 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.²⁵⁹

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 will therefore judge the danger to be common or likely to occur in the future.²⁶⁰ The rule of thumb that leads people to believe that something is more likely if they can readily bring to mind relevant examples is the aforementioned availability heuristic. 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.²⁶¹ However, very common and familiar dangers are often associated with more recent or frequent examples, heightening perception of associated harms.²⁶² 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

²⁵⁶ Baker, *supra* note , at 346, 352. (noting circumstances and relationships between risks that are familiar and dreaded in regard to public preference)

²⁵⁷ Slovic, *Perception II supra* note 8 at 280.

²⁵⁸ See Paul Slovic, Ellen Peters, Donald G. MacGregor, Melissa L. Finucane, *Affect, Risk, and Decision Making*, 24 HEALTH PSYCHOL. S35-S40, 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.”)

²⁵⁹ Slovic, *Perception II supra* note 8 at 283. (examine fig. 2 demonstrating that generally people desire more regulation and protection from unknown risks as opposed to known risks)

²⁶⁰ See generally, Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, in JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES 3 (Daniel Kahneman, Paul Slovic & Amos Tversky eds., 1982) (discussing the availability heuristic, among other heuristics and biases).

²⁶¹ See Slovic, Fischhoff, Lichtenstein, *supra* note , at 86. (fig 1 and 2 showing that the most feared risks included the unknown and new technology, e.g. nuclear power, nuclear weapons, nerve gas, and DNA research)

²⁶² 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.

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.²⁶³

3. Voluntariness

People are particularly frightened by risks that are involuntary.²⁶⁴ The extent to which risks associated with an activity are voluntarily assumed was one of the earliest hypothesized influences on risk judgments.²⁶⁵ Early psychometric investigations reinforced the idea that voluntarily assumed risks are more palatable to the public and judged to be less problematic than non-voluntary hazards by a large margin.²⁶⁶ The voluntariness quality is related to the issue of control, and reinforces the notion that when members of the public perceive that they have control over exposure to potential harms, they are less fearful.²⁶⁷ 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.²⁶⁸

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.²⁶⁹ 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 1000 times greater than they would tolerate from involuntary sources (e.g., food preservatives, nuclear energy, natural disasters) that provide the same level of benefit.²⁷⁰ Slovic and his colleagues, using a non-historical, survey methodology, found that respondents preferred somewhat higher risk levels for voluntary, as

²⁶³ Cass 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 and Memory 551 (1978) (noting that certain causes of death (accidents, homicides, tornadoes, fires, and cancer) were relatively overestimated, while others (stroke, diabetes, tuberculosis, asthma) were underestimated).

²⁶⁴ See Slovic, Fischhoff, & Lichtenstein, *supra* note 31, at 83.

²⁶⁵ Chauncey Starr posited that the public accepts will accept a risk that is 1000 greater when the risk is voluntarily assumed versus when the danger is imposed upon individuals. Starr, *supra* note 45, at 1232-38.

²⁶⁶ See Fischhoff, Slovic, & Lichtenstein, *supra* note 31, at 143.

²⁶⁷ Slovic, *Perception II supra* note 8 at 283 (noting that "hazards judged to be 'voluntary' tend also to be judged as 'controllable.'")

²⁶⁸ Kasperson, Renn, Slovic, et al. *supra* note 4, at 178. See also, Slovic, Fischhoff, & Lichtenstein, *supra* note 3, at 83.

²⁶⁹ Starr, *supra* note 45 at 1283 ("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 "in- voluntary" risk. As one would expect, we are loathe to let others do unto us what we happily do to ourselves.")

²⁷⁰ Starr, *supra* note 45 at 1283.

opposed to involuntary activities.²⁷¹ 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 100 to 1000) choice in exposure to risk remains an important factor in risk analysis.²⁷²

4. Catastrophic Potential

Whether the risk carries with it the potential for catastrophe is another important consideration.²⁷³ A definition of "catastrophic" is the potential to affect many people simultaneously.²⁷⁴ 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 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.²⁷⁵ Risks with catastrophic potential are reportedly perceived by the public as up to fifty times more risky than non-catastrophic risks. Moreover, surveys have revealed that voluntary risks are preferred by a factor of 100 to 1000.²⁷⁶ This may also be related to the issue of perceived control and status quo.²⁷⁷ 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.²⁷⁸ 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.²⁷⁹ Risks assumed on an individual level, such as those posed by cigarette smoking, alcohol consumption, and driving a motor vehicle are judged

²⁷¹ *Id.*

²⁷² 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).

²⁷³ Kasperson, Renn, Slovic, et al. *supra* note 4, at 178.

²⁷⁴ Sunstein, *American Reactions*, *supra* note 160, at 506.

²⁷⁵ 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.

²⁷⁶ Litai et al., *supra* note at 219.

²⁷⁷ See Slovic, *Perception II supra* note 8 at 280-85.

²⁷⁸ List of Disasters by year, including the highly publicized 2010 Oil Spill, can be found at <http://www.infoplease.com/ipa/A0001437.html> (last visited, July 14, 2010).

²⁷⁹ See Section II *infra*.

as less fear-inducing in part because the consequences of such risks are seldom catastrophic.²⁸⁰

Another characteristic of risk that is 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.²⁸¹ The qualities of being catastrophic and being irreversible have been an indication for the need to take extra precautions for countries and governments no less than individuals.²⁸² 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.”²⁸³ 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.²⁸⁴

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 harms. The unequal exposure to risk of a particular identifiable population may trigger outrage and indignation,

²⁸⁰ Torbjorn Rundmoj, Associations Between Affect and Risk Perception 5 J. of Risk Res., 119, 134 (2002).

²⁸¹ Fischhoff & Fischhoff, *supra* note , at 11.

²⁸² “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.” Cass R. Sunstein, *Irreversible and Catastrophic*, 91 Cornell L. Rev. 841, 841 (2006)[hereinafter Sunstein, *Irreversible and Catastrophic*]

²⁸³ United Nations Conference on Environment and Development, June 3-14, 1992, Rio Declaration on Environment and Development, princ. 15, U.N. Doc. A/ CONF.151/26/Rev.1 (Vol. I) (Jan. 1, 1993), quoted in Björn Lomborg, *The Skeptical Environmentalist: Measuring the Real State of the World* 348 (2001).

²⁸⁴ See Bruna Di Marchi, *Public Participation in Risk Governance*, 30 Sci. & Pub. Pol, 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 citation omitted).

depending upon the history and perceived vulnerability of the group.²⁸⁵ Beck draws parallels between the modern allocation of risk and outcome with “legitimate” methods of wealth distribution.²⁸⁶ Risks, like resources, possess the characteristic of profoundly affecting quality of life, and, like resources, risks are virtually never uniformly distributed across all segments of society.²⁸⁷ Differences will be particularly acute in populations that share a history of discrimination with respect to risk exposure.²⁸⁸ Dangers threaten the lives, health, and property of members of society, but they may also jeopardize psychological security, freedoms, and interpersonal relationships.²⁸⁹ Nowhere is this more relevant than in situations in which members of society are systematically and disproportionately subjected to particular types of risks.²⁹⁰ A prominent example is the environmental justice movement, where a rising tide of concern and unrest has led to efforts to reshape environmental policy.²⁹¹

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 been related to questions of who has power to effect 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.²⁹² The EPA has endorsed the systematic examination of potentially unequal exposure to pollutants across various disadvantaged communities.²⁹³

²⁸⁵ Examples of perceived inequity can often be found by examining various media outlets. (See e.g., African American man accuses president of not caring about black people in the wake of Hurricane Katrina, http://en.wikinews.org/wiki/Rapper_Kanye_West_denounces_Bush_response,_American_media_at_hurricane_relief_telethon ; Article detailing race and Hurricane Katrina, <http://www.cbsnews.com/stories/2005/09/03/katrina/main814623.shtml> (last visited, July 14, 2010))

²⁸⁶ Beck, *supra* note 9, at 19.

²⁸⁷ *Id.* at 41 (“... there is a systematic ‘attraction’ between extreme poverty and extreme risk.”)

²⁸⁸ African American man accuses president of not caring about black people in the wake of Hurricane Katrina, http://en.wikinews.org/wiki/Rapper_Kanye_West_denounces_Bush_response,_American_media_at_hurricane_relief_telethon ; Article detailing race and Hurricane Katrina, <http://www.cbsnews.com/stories/2005/09/03/katrina/main814623.shtml>

²⁸⁹ For a discussion of the potential impacts on human well-being and social structures posed by risks, see Kasperson & Kasperson, *supra* note 18, at 96.

²⁹⁰ See Beck, *supra* note 9, at 23 (discussing “social risk positions”).

²⁹¹ See generally Dorceta E. Taylor, *The Rise of the Environmental Justice Paradigm: Injustice Framing and the Social Construction of Environmental Discourses*, 43 AM. BEHAV. SCI. 508 (2000) (detailing the ways in which the community-based environmental justice movement has influenced environmental research and policy).

²⁹² P. M. Sandman, *Explaining Environmental Risk*. Washington, D.C.: U.S. Environmental Protection Agency, Office of Toxic Substances, (1986). See also, BARRY L. JOHNSON, IMPACT OF HAZARDOUS WASTE ON HUMAN HEALTH: HAZARD, HEALTH EFFECTS, EQUITY, AND COMMUNICATIONS ISSUES 33 (1999).

²⁹³ See, e.g., 2 U.S. Env'tl. Prot. Agency, *Environmental Equity: Reducing Risk for All Communities* 31-36 (1992);

Widespread concern over inequalities in environmental protections has led to organizing efforts in order to heighten awareness and advance more progressive policies and practices.²⁹⁴

C. *Cultural and Personal Identity Factors*

Cultural approaches to risk perception and assessment have had two general foci. The first is the role of different identified “worldviews” on the individual’s experience of risk.²⁹⁵ The second is on the role of emotion (or affect) on risk perception.²⁹⁶ 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 conceived of socially cultivated understandings common to a group of people.²⁹⁷ 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.²⁹⁸ Emotional reactions to dangers are then viewed as expressions of these individually held but culturally derived values and norms.²⁹⁹

1. Emotions

Significant debate has centered on the question of whether emotions play an adaptive or maladaptive role in risk evaluation has generated substantial debate.³⁰⁰ There are two fundamental ways in which human beings comprehend risk. The analytic system uses algorithms and normative rules, such as probability calculus, formal logic, and risk assessment. This system is relatively slow, effortful, and

²⁹⁴ One example was the First National People of Color Environmental Leadership Summit, which was

held in Washington, DC. in 1991. For this and other examples, see SECOND NATIONAL PEOPLE OF COLOR ENVIRONMENTAL LEADERSHIP SUMMIT: Celebrating Our Victories, Strengthening Our Roots (found at <http://www.ejrc.cau.edu/summit2/%20EJTimeline.pdf>) (last visited, Mar. 20, 2010). 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).

²⁹⁵ See Kahan, Slovic, Braman, & Gastil, *supra* note , at 1072. (“growing body of work suggests that cultural worldviews permeate all of the mechanisms through which individuals apprehend risk, including their emotional appraisals of putatively dangers activities, their comprehension and retention of empirical information, and their disposition to trust competing sources of risk information.”)

²⁹⁶ Although the terms “emotion” and “affect” have received disparate treatment, particularly in the psychological literature, for the present purposes, they will be referenced interchangeably. There is some precedent for using these terms in this fashion.

²⁹⁷ See Section I, *supra*.

²⁹⁸ Kahan, Slovic, Braman, & Gastil, *supra* note , at 1072.

²⁹⁹ Kahan, Slovic, Braman, & Gastil, *supra* note , at 1072.

³⁰⁰ *Id.*

requires conscious control.³⁰¹ The experiential system is intuitive, fast, mostly automatic, and not very accessible to conscious awareness.³⁰² The experiential system enabled human beings to survive during their long period of evolution and remains today the most natural and most common way to respond to risk. It relies on images and associations, linked by experience to emotion and affect (a feeling that something is good or bad).³⁰³ This system represents risk as a feeling that tells us whether it's safe to walk down a dark street or drink strange-smelling water.³⁰⁴

Proponents of formal risk analysis tend to view affective responses to risk as across-the-board irrational. Current wisdom disputes this view. The rational and the experiential systems of individuals operate in parallel, and each seems to depend on the other for guidance.³⁰⁵ Studies have demonstrated that analytic reasoning cannot be effective unless it is guided by emotion and affect.³⁰⁶ According to Slovic,

Various 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 appraisal. This affective mode of response, unburdened by cognition and hence much faster, has considerable adaptive value.³⁰⁷

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*.³⁰⁸ 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,³⁰⁹ this possibility has been largely refuted by findings suggesting that emotional reactions come first, and that effortful reasoning processes supplement or justify initial affective

³⁰¹ See Paul Slovic, Melissa Finucane, Ellen Peters, and Donald G. MacGregor, *Risk as Analysis and Risk as Feelings: Some Thoughts about Affect, Reason, Risk, and Rationality* 24 *Risk Anal.* 2 (2004).

³⁰² See Slovic, Finucane, Peters, & MacGregor, *supra* note ,

³⁰³ See Slovic, Finucane, Peters, & MacGregor, *supra* note

³⁰⁴ Slovic, Finucane, Peters, & MacGregor, *supra* note ;See Nussbaum, *supra* note , at 20. See also, George F. Loewenstein, Christopher K. Hsee, Elke U. Webster, & Ned Welch, *Risk as Feelings*, 127 *Psychological Bulletin* 267 (2001)(proposing an alternative theoretical perspective, the risk-as-feelings hypothesis, that highlights the role of affect experienced at the moment of decision making).

³⁰⁵ See Slovic, Finucane, Peters, & MacGregor, *supra* note ,

³⁰⁶ See Slovic, Finucane, Peters, & MacGregor, *supra* note

³⁰⁷ See Slovic, *Rational Actors*, *supra* note 220 at 172.

³⁰⁸ Early psychometric studies of risk perception (Fischhoff *et al.*, 1978; Slovic, 1987). Those studies showed that feelings of dread were the major determinant of public perception and acceptance of risk for a wide range of hazards.

³⁰⁹ See generally, Kahan, *supra* note 82.

reactions.³¹⁰ 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.³¹¹ 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.³¹²

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.³¹³ The value of affective reactions is explicit in the “cultural evaluator” model advanced by Dan Kahan. The cultural evaluator model of risk perception views emotional responses to risk as reflective of an individual’s culturally defined, expressive evaluation of potential dangers.³¹⁴ 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”³¹⁵ 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).³¹⁶

Instead of taking a pessimistic view of affect, cultural risk theory views emotion as signaling underlying values, which themselves have worth.³¹⁷ 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.”³¹⁸ 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

³¹⁰ See Slovic, *Rational Actors*, *supra* note 220 at 172.

³¹¹ See Timothy D. Wilson, STRANGERS TO OURSELVES: DISCOVERING THE ADAPTIVE UNCONSCIOUS 170 (1998).

³¹² *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. See Wilson, *supra* note 166, at 701.

³¹³ See Martha C. Nussbaum, UPHEAVALS OF THOUGHT: THE INTELLIGENCE OF EMOTIONS 19 (2001) (“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.”)

³¹⁴ See generally, Kahan, *supra* note 82.

³¹⁵ *Id.* at 741.

³¹⁶ See Kahan, *supra* note 82, at 749 (“ . . . the cultural evaluator theory...offers a very different account of how...emotions enter the cognition of risk...than the irrational weigher theory”)

³¹⁷ See Kahan, *supra* note 82, at 751.

³¹⁸ Molly J. Walker Wilson, *Adaptive Responses to Risk and the Irrationally Emotional Public*, 54 ST. LOUIS L.J. ____ (forthcoming 2010). See also, Kahan, *supra* note 82, at 758.

risks.”³¹⁹ Emotions are highly dependent upon other features of the risk context.³²⁰ When there is a known, hated perpetrator, 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.³²¹ A recent example from American history is Osama Bin Laden.³²²

2. Cultural Worldviews

There are two ways of categorizing characteristics of the risk perceiver. The first is based upon demographic information.³²³ The second involves what cultural risk scholars call cultural worldview typology.³²⁴ Proponents of this typology believe that a person’s risk preferences are guided by their moral or philosophical approach to the world.³²⁵ 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.³²⁶

Members of society who have hierarchic orientations tend to accept risks, provided that the risk is legitimated by governmental authorities or other authoritarian experts; however, they are deeply distrustful of risks that threaten the social order.³²⁷ Egalitarians, on the other hand, are presumed to reject risks that are imposed by a small group on a large group, particularly when the imposition is by those in authority and when effects will affect future generations.³²⁸ 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.³²⁹ Orientation toward the group is hypothesized to have profound influences on risk perception.³³⁰ Individual worldviews might also interact with risk characteristics. For example, there is

³¹⁹ Kahan, *supra* note 82, at 754.

³²⁰ Kahan, *supra* note 82, at 741,

³²¹ *Id.*

³²² See Deborah A. Small & George Loewenstein, *The Devil You Know: The Effects of Identifiability on Punishment*, 18 J. Behav. Decision Making 311, 315-16 (2005) (discussing the common urge to exact revenge upon identifiable wrong-doers).

³²³ See Mary Douglas, NATURAL SYMBOLS 54-68 (1970).

³²⁴ See *id.* at 54-68.

³²⁵ See *id.*

³²⁶ See Douglas & Wildavsky, *supra* note 92; see also Suzanne Rippl, *Cultural Theory and Risk Perception: A Proposal for a Better Measurement*, 5 J. of Risk Res. 5 147, 149 (2002).

³²⁷ See generally, Douglas & Wildavsky, *supra* note 92.

³²⁸ See Douglas & Wildavsky, *supra* note 92, at 126. (“those organized on voluntaristic, egalitarian principles will make the sectarian selection of risks and justify their view of danger...”).

³²⁹ Douglas & Wildavsky, *supra* note 92 at 99, 101; see also, Rippl, *supra* note at 150.

³³⁰ See Steve Rayner, *Cultural Theory and Risk Analysis*, in SOCIAL THEORIES OF RISK 83, 87 (S. Krimsky & D. Goldin eds., 1992).

some thought that personality variables influence an individual's degree of concern over the potential for catastrophic outcomes generally.³³¹

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 are particularly feared by respondents of advanced age.³³² Certain populations within a society assign higher importance to some risks than other groups based upon a shared vulnerability to associated risks.³³³ 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.³³⁴ One category of risk that is particularly likely to be relevant to large segments of the population is those risks likely to be catastrophic in nature.³³⁵ The self-relevance feature may help to explain why catastrophic risks (or those risks perceived as catastrophic) are more likely to cause wide-spread panics.³³⁶ A lack of perceived self-relevance may also explain why some serious risks receive surprisingly little attention. An example is climate change.³³⁷ Until recently, climate change received relatively little public attention. Climate change is a harm that is hard 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, it can be difficult to 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

³³¹ "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." Marris, Langford, & O'Riordan, *supra* note 4 at 640. For more on the cultural view, see Aaron Wildavsky and Karl Dake, *Theories of Risk Perception: Who Fears What and Why?*, 119, *Risk* 41 (1990).

³³² *Id.*

³³³ See Sunstein, *Irreversible and Catastrophic*, *supra* note 262.

³³⁴ Kasperson, Renn, Slovic, et al. *supra* note 4, at 178 ("various groups present competing evidence based upon their own perceptions and social agenda.") *id.*

³³⁵ *Id.s*

³³⁶ Sunstein, *Irreversible and Catastrophic*, *supra* note 262, at 841; see also, Kasperson, Renn, Slovic, et al. *supra* note 4, at 178.

³³⁷ Slovic, *Perception II* *supra* note 8 at 282 (discussing how the risk of auto accidents is routinely underestimated).

significant considerations and germane to any attempt to construct an effective risk-perception prediction model.

1. Benefits of Activity / Cost of Precautions

Traditional risk analysis featured 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.³³⁸ 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.³³⁹ 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.³⁴⁰ The importance of realized benefits to the acceptability of risks may be captured at least indirectly by the measure of voluntariness.³⁴¹ 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.”³⁴²

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” as the vividness bias.³⁴³ As previously mentioned, vivid language is frequently used to evoke emotions and increase cognitive recall, making the technique of using dramatic examples and detailed descriptions common in a variety of forums and for a range of purposes. The European Union, for

³³⁸ Starr, *supra* note 45.

³³⁹ Fischhoff, Slovic, & Lichtenstein, *supra* note 8, at 148-50; *see also*, Susan Hadden, *Public Perception of Hazardous Waste*, 11 *Risk Analysis* 47, 48 (1991).

³⁴⁰ “To the extent that people understand that they are themselves contributors to climate change, they are inclined to diminish the magnitude of the threat.” Sunstein, *American Reactions*, *supra* note 160, at 532.

³⁴¹ Susan G. Hadden, *A CITIZEN'S RIGHT TO KNOW* 137 (1989) (noting public use of risk as “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 *Env'tl. 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.”)

³⁴² *Id.* at 915.

³⁴³ *See* Richard Nisbett & Lee Ross, *HUMAN INFERENCE: STRATEGIES AND SHORTCOMINGS OF SOCIAL JUDGMENT* 55-61 (1980)

example, has required cigarette packages to feature images of diseased lungs.³⁴⁴ Other similar campaigns have been launched and promulgated with substantial aid from such methods.³⁴⁵

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.³⁴⁶ 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."³⁴⁷

The vividness bias and the availability heuristic are related, in that vivid depictions of events make examples of such events more cognitively available.³⁴⁸ 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

³⁴⁴ See Paul Meller, *Gag Order: EU Law's Graphic Tobacco Warnings* Int'l Herald Tribune (March 1, 2001) found at <http://lists.essential.org/pipermail/intltobacco/2001q1/000426.html> (last visited, Aug. 28, 2010).

³⁴⁵ See, e.g. Graphic campaigns for anti-abortionists include strategic use of vivid pictures and language. See e.g., http://www.ncregister.com/blog/is_this_pro-life_ad_too_graphic/; <http://www.priestsforlife.org/images/index.aspx>; <http://www.kiiitv.com/news/local/96425709.html>; <http://www.firstcoastnews.com/news/local/news-article.aspx?storyid=30784> (examples of vivid language used in a PETA campaign); http://www.nzherald.co.nz/road-safety/news/article.cfm?c_id=308&objectid=10579763; http://www.npr.org/programs/atc/features/2002/oct/texas_dwi/index.html; <http://www.adcouncil.org/default.aspx?id=49> (explicit wording used in a anti drunk driving advertisement) (last visited, July 30, 2010).

³⁴³ Sunstein, *Cognition*, *supra* note 81, at 1067. (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."); Kuran & Sunstein, *supra* note 28 at 707; 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, [policymakers] may be prodded to regulate insignificant risks, and in others they may face apathy in promoting public health measures.")

³⁴⁷ See Tversky & Kahneman, *supra* note 66, at 1127. 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." See Sunstein, *American Reactions*, *supra* note 160, at 507.

³⁴⁸ For more on the availability heuristic, see Kuran & Sunstein, *supra* note at 683-691; see also, Jolls, Sunstein, & Thaler, *supra* note 65, at 1519; see also, Jolls, *supra* note 68, at 270-71.; see also, Korobkin & Ulen, *supra* note , at 1091.; see also, Pidot, *supra* note 68, at 222-23; see also, Sunstein, *Precautions*, *supra* note 68, at 77.

the question of probability altogether, focusing instead on the worst that might happen.”³⁴⁹ In contrast, some hazards are inconspicuous, slow to develop, and subtle as their approach. An example is slow-growing cancers.³⁵⁰ The risk from such cancers is very serious, and may be statistically more devastating than other types of risks.³⁵¹ 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.³⁵² The latter categories of events are not only easier to retrieve, but they involve images that are prone to slow cognitive decay.³⁵³

E. *The Media and Risk Perception*

What the media chooses to report has important implications for how members of society perceive risks.³⁵⁴ The infamous Love Canal situation has been cited as an example of the media’s powerful role in shaping public perception.³⁵⁵ Initially alarming reports caused widespread concern, and subsequent attempts to revise initial estimates of harm were ineffective in reassuring the public.³⁵⁶ 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.³⁵⁷ At times the realities of a developing story and a firm deadline force journalists to file a partial story, which may not include all of the important details, or may not even be able to provide the most

³⁴⁹ Sunstein, *American Reactions*, *supra* note 160, at 507.

³⁵⁰ Carcinoid is a slow growing type of neuroendocrine tumor. See <http://www.carcinoid.org/> (last visited, July 29, 2010).

³⁵¹ Sunstein, *American Reactions*, *supra* note 160, at 507.

³⁵² See List of Disasters by year, including highly publicized 2010 Oil Spill (found at: <http://www.infoplease.com/ipa/A0001437.html>) (last visited, July 29, 2010).

³⁵³ See Howard Eichenbaum, Norbert Fortin, *Episodic Memory and the Hippocampus: It’s About Time*, 12 CURRENT DIRECTIONS IN PSYCHOL. SCI. 53, 53 (2003) available at <http://www.jstor.org/stable/20182835> (“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...”).

³⁵⁴ Altheide, *supra* note 13, at 664. The role of the media as a facilitator with the power to influence public perceptions of risk is a vital player in the risk perception landscape.

³⁵⁵ 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, 472-6 (2007) (Pogue gives a detailed description of: regulation before the love Canal incident, the incident itself, and the response to the incident).

³⁵⁶ See Kasperson, Renn, Slovic, et al. *supra* note 4, at 184.

³⁵⁷ See James W. Potter, *MEDIA LITERACY* 103 (3d ed 2005).

relevant details of the story, depending upon whether the bulk of the information is gathered after a deadline.³⁵⁸ Newspapers face the most difficult deadline constraints, while radio, television, and the internet are less affected by deadlines.³⁵⁹

As with any industry, media outlets have specific goals. General goals for media include constructing audiences and maximizing profits.³⁶⁰ Like any other industry, the media seeks to make a profit³⁶¹ by decreasing expenses and increasing revenue.³⁶² 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.³⁶³ The most direct way of augment audience size is to adopt a marketing perspective, paying special attention to the types of stories that will generate the largest audiences.³⁶⁴ Often, unusual and sensational news stories draw audiences.³⁶⁵ Recent commentary has discussed the media trend toward gossip, celebrities, and sensationalistic stories.³⁶⁶ Story formulas are another influence on what gets reported.³⁶⁷ Time constraints lead reporters to resort to shortcuts, or story formulas, to generate material.³⁶⁸ The reliance on these formulas can skew or even change the way the story will be perceived by the public.³⁶⁹

³⁵⁸ *Id.* at 103. (Potter provides an example of this situation regarding morning newspapers. They 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 surly is already aware of it, but if she does not then the paper did not report the full news).

³⁵⁹ *Id.* at 171.

³⁶⁰ *Id.* at 180. *But see* Elizabeth M. Perse, MEDIA EFFECTS AND SOCIETY 228 (2001) (“ . . . the goal of mass media should be to improve society, not merely to give people what they want.”)

³⁶¹ David Croteau & William Hoynes, THE BUSINESS OF MEDIA: CORPORATE MEDIA AND THE PUBLIC INTEREST 109 (2000).

³⁶² Potter, *supra* note 337, at 182.

³⁶³ *Id.* at 124.

³⁶⁴ *Id.* at 173.

³⁶⁵ Perse, *supra* note 343 at 39.

³⁶⁶ Kelli S. Burns, CELEB 2.0: HOW SOCIAL MEDIA FOSTER OUR FASCINATION WITH POPULAR CULTURE (celebrity gossip has become and accepted part of the news, with celebrity antics showing up in venerable mainstream media outlets . . .); *see also*, Potter, *supra* note 337, at 107. (Potter notes 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).

³⁶⁷ *Id.* at 191.

³⁶⁸ *Id.* Judges and legal practitioners have had to develop methods for dealing with the fallout from media soundbites and skew. *See* Lieve Gies, LAW AND THE MEDIA: THE FUTURE OF AN UNEASY RELATIONSHIP 8 (referring to the legal system's “extraordinary resilience and its ability to take on media detractors.”)

³⁶⁹ *Id.* 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).

2. What the Media Reports

The media's choice of what to report is often largely determinative of what receives public attention.³⁷⁰ Media outlets tend to report on risks that reporters and editors already deem to be of interest to the public.³⁷¹ The initial determination is a key factor in determining what news reaches the public. The media tends 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.³⁷² Routine sources of danger and common risks are less newsworthy. Catastrophes and unusual risks are novel and imminently sellable.³⁷³ The amount of time it takes for an event to unfold, or to occur, also plays an important role in how newsworthy a story is.³⁷⁴ 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.³⁷⁵ Another factor important to determining what information will make it into the media is whether there is a "human angle" to the story.³⁷⁶ Personal accounts are particularly likely to engage the audience.³⁷⁷ News stories that focus on the trials of a single person are also more likely to contain salient details, making the story more likely to be recalled and recounted.³⁷⁸

While reporters seek out compelling subject matter, story content is not the only consideration. The types of sources available also influence which stories are reported. The media tend to favor official sources as opposed to alternative sources, and 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.³⁷⁹ When the story involves a crisis, such as a natural disaster, official sources are likely to be particularly favored by the media. After most of the fallout from a crisis has

³⁷⁰ See Kasperson & Kasperson, *supra* note 18, at 98.

³⁷¹ Edward S. Herman *The Media and Markets in the United States*, in *THE RIGHT TO TELL: THE ROLE OF MASS MEDIA IN ECONOMIC DEVELOPMENT* 66, The World Bank Institute (2002).

³⁷² Emma Hughes, Jenny Kitzinger, & Graham Murdock, *The Media and Risk*, in *Risk in Social Science* 250, 253 (Peter Taylor-Gooby & Jens O. Zinn eds., 2006).

³⁷³ *Id.* at 255.

³⁷⁴ *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-12-234(10)(b) (2000) (indicating that the subject manifest "an *immediate* danger of physical injury to others or himself")(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 (1995)(emphasis added).

³⁷⁵ *Id.* See also, Herman, *supra* note 354.

³⁷⁶ See Hughes et al., *supra* note 355, at 256.

³⁷⁷ *Id.*

³⁷⁸ *Id.*

³⁷⁹ *Id.* at 253. (Peter Taylor-Gooby & Jens O. Zinn eds., 2006). ; see also, Herman, *supra* note 354 at 68.

passed, the media tend to become more critical of the sources they have used.³⁸⁰ 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, they also often outlast any opposition with fewer resources.³⁸¹

The geological, cultural, or political focus of the reporter or media outlet also influences that which is deemed newsworthy. Events that are of particular personal, cultural, or political relevance to the audience are particularly likely to be reported.³⁸² 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.³⁸³ While the media is 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 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.³⁸⁴ 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.³⁸⁵

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.³⁸⁶ However, the degree to which the event assumes significance for risk perception varies widely.³⁸⁷ The significance of a particular

³⁸⁰ See Hughes, *supra* note 355, 254.

³⁸¹ *Id.* at 254. (An example of this was silicone breast implants in the 1990's. 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 their resources and public relations officials. Later coverage was then dominated by assurances by the industry that breast implants were safe).

³⁸² *Id.* at 256. (An example of this occurred within the British press. In July 2005, 52 people died as the result of a terrorist attack on the subway system in London. This was discussed at length on television and radio, and made the front page news on many print media outlets. In contrast, almost 25,000 civilians have died in Iraq between March 2003 and March 2005, but this information is rarely reported on within British media outlets).

³⁸³ *Id.* at 257.

³⁸⁴ *Id.*

³⁸⁵ *Id.* (Many more children are killed by the hands of their mothers or fathers each year than by strangers). See Molly J. Walker Wilson, *An Evolutionary Perspective on Male Violence: Practical and Policy Implications*, 32 Am. J. of Crim. L. 291, 293 (2005).

³⁸⁶ Pidgeon, *supra* note 59, at 146 (explaining that “. . . 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.”)

³⁸⁷ Kasperson & Kasperson, *supra* note 18, at 96 (explaining “. . . the 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

signal can be profoundly influenced by the degree to which it is broadcast and portrayed in the media.³⁸⁸ 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, which are: volume, whether the information is disputed, the extent to which the information is dramatized, and the symbolic connotations to the information.³⁸⁹ After information is sent out by an amplification station and received, it can then be amplified again resulting in behavioral responses creating secondary effects and possibly third-order effects. These are ripple effects.³⁹⁰

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.³⁹¹ To the extent that the risk is debated, resulting uncertainty can increase public anxiety.³⁹² Moreover, sensationalistic accounts of an event designed to increase interest, can serve to heighten concern. Sensational new stories generally rely on vivid reenactments or recounts, which increase awareness and memory for the event long after initial exposure.³⁹³ Finally, symbolic language designed to heighten drama is commonly employed, resulting in further amplification of risk perception.³⁹⁴

The importance of memorable and emotionally relevant stimuli for risk perception is critical to understanding the effect of the media in public risk response.³⁹⁵ A death from an event such as an airplane crash is 6,000 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.³⁹⁶ The media also frequently increase coverage about events that occur with declining frequency, while decreasing coverage about events that are increasing in frequency. For example, media coverage of salmonella poisoning incidents is decreasing even though the number of incidents is on the rise.³⁹⁷ Similarly, the

illuminating risk in its full complexity, [and] is sensitive to the social settings in which risk occurs...[recognizing] that social interactions may either amplify or attenuate the signals to society about the risk.”)

³⁸⁸ Lynn J. Frewer, Susan Miles, & Roy Marsh, *The Media and Genetically Modified Foods: Evidence in Support of the Social Amplification of Risk*, 22 *Risk Analysis: An Official Publication of the Society for Risk Analysis*, 701,702 (2002).

³⁸⁹ Kasperson, Renn, Slovic, et al. *supra* note 4, at 182-4 (Kasperson provides a detailed description of this ripple effect, in addition he provides a visual representation of this phenomenon).

³⁹⁰ *Id.*(Kasperson provides a detailed description of this ripple effect, in addition he provides a visual representation of this phenomenon).

³⁹¹ *Id.*at 184. See Also Frewer et al., *supra* note 371, at 702 (Frewer et al. provide contrasting examples of how the volume of information can influence the social amplification of risk).

³⁹² Kasperson, Renn, Slovic, et al. *supra* note 4, at 184.

³⁹³ *Id.* at 184-5.

³⁹⁴ *Id.* at 185.

³⁹⁵ Sunstein, *Risk and Reason*, *supra* note 185, at 33-34.

³⁹⁶ Hughes et al., *supra* note 355, at 250

³⁹⁷ *Id.*

number of stories reporting on dangers posed by environmental pollutants is increasing, while pollution levels are declining.³⁹⁸ The media can mislead members of the public, amplifying fear about some risks, while attenuating concerns over other risks.³⁹⁹

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.⁴⁰⁰ 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, the media is often used by non-media sources to control the hearts and minds of Americans.⁴⁰¹

CONCLUSION

This Article has argued that the current dearth of understanding how individuals evaluate and assess risk is a serious problem from the perspective of managing risk, and public reactions to risk events. Citizens' views on risks are not often considered systematically before risk decisions are made. Lack of public input is problematic because, as recent commentary has noted, resource allocation is never value-neutral—particularly where risk management is concerned.⁴⁰² 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 based goals.”⁴⁰³ All risk decisions involve judgments about the most appropriate way to balance benefits against costs, allocate resources, and distribute hazard potentials, and hence such decisions often implicate complex and value-laden questions about equality and fairness.⁴⁰⁴

Although there is debate about how to manage risks (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

³⁹⁸ *Id.* at 250.

³⁹⁹ Kasperson, Renn, Slovic, et al. *supra* note 4, at 182.

⁴⁰⁰ Wahlberg & Sjöberg, *supra* note 127, at 31 (regardless of extent, it is undeniable that media does play a role in public risk perception).

⁴⁰¹ See Francesco Sobbrío, *Indirect Lobbying and Media Bias*, 1 (University of Southern California) (2010)(see generally for proposition that lobbyists indirectly control and bias the media in their favor behind the scenes).

⁴⁰² See generally, Kahan, *supra* note 82.

⁴⁰³ See Hornstein, *supra* note 24 at 630-31.

⁴⁰⁴ See e.g., Roger E. Kasperson (ed.), *EQUITY ISSUES IN RADIOACTIVE WASTE MANAGEMENT* (1983).

information is received and evaluated is manifest in data collected from survey studies on individual attitudes about risk. Renown risk researcher Paul Slovic notes that

a 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.*⁴⁰⁵

If risk decisions are to well serve the public, they 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. However, judgments of risk analysts 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.⁴⁰⁶ 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 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, it is also 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.⁴⁰⁷ Some communication campaigns may be timely and informative, others may help to

⁴⁰⁵ Slovic, *Perception II supra* note 8 at 283 (emphasis added).

⁴⁰⁶ Baruch Fischhoff, Stephen R. Watson, & Chris Hope, *Defining Risk*, 17 Pol. Sci. 123-139, 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.”)

⁴⁰⁷ 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) (discussion of Salem witch trial panic and relation to modern day “witchhunts” involving internet sex offenders); Albert M. Rosenblatt, *Under Stress: The Constitution in Times of National Ordeal*, 12 U. PA. J. CONST. L. 143, 143 (2009) (discussing 9-11 and USA Patriot act/torture).

fuel a perfect storm, creating unnecessary anxiety and wasted effort.⁴⁰⁸ With heightened awareness of the social and cultural factors that drive risk assessment, lawmakers can better manage risks and address public risk responses proactively.

⁴⁰⁸ See the D.A.R.E. as a helpful campaign, <http://www.dare.com/home/default.asp> (last visited July 7, 2010); see also, Burt the Cold War Turtle as needless and anxiety producing, <http://www.youtube.com/watch?v=ixy5FBLnh7o> (last visited July 7, 2010).

APPENDIX: FIGURE 1—RISK PERCEPTION MODEL

