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ESSAY

ON THE DIVERGENT AMERICAN REACTIONS TO TERRORISM AND CLIMATE CHANGE

Cass R. Sunstein*

Two of the most important sources of catastrophic risk are terrorism and climate change. The United States has responded aggressively to the risk of terrorism while doing very little about the risk of climate change. For the United States alone, the cost of the Iraq War is in excess of the anticipated cost of the Kyoto Protocol. The divergence presents a puzzle; it also raises more general questions about both risk perception and the public demand for legislation. The best explanation for the divergence emphasizes bounded rationality. Americans believe that aggressive steps to reduce the risk of terrorism promise to deliver significant benefits in the near future at acceptable cost. By contrast, they believe that aggressive steps to reduce the risk of climate change will not greatly benefit American citizens in the near future—and they are not willing to pay a great deal to reduce that risk. This intuitive form of cost-benefit analysis is greatly influenced by behavioral factors, including the availability heuristic, probability neglect, outrage, and myopia. All of these contribute, after 9/11, to a willingness to support significant steps to respond to terrorism and to relative indifference to climate change. It follows that Americans are likely to support significant steps in response to climate change only if one of two conditions is met: the costs of those steps are perceived to be acceptably low; or new information, perhaps including a salient incident, indicates that Americans have much to gain from risk reduction in the relatively near future.

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“We have to deal with this new type of threat in a way we haven’t yet defined. . . . With a low-probability, high-impact event like this . . . [i]f there’s a one percent chance that Pakistani scientists are helping al Qaeda build or develop a nuclear weapon, we have to treat it as a certainty in terms of our response.”

—Vice President Dick Cheney¹

“[C]limate change is the most severe problem that we are facing today—more serious even than the threat of terrorism.”

—Sir David King²

“I see little evidence, at least in the United States, that people want to make significant additional sacrifices to raise living standards among the people who live now in the developing world. It would surprise me if they could get excited about raising liv-

1. Ron Suskind, *The One Percent Doctrine* 61–62 (2006).

2. David A. King, *Climate Change Science: Adapt, Mitigate, or Ignore*, 303 *Science* 176, 176 (2004).

ing standards in those same parts of the world at a time in the future”

—Thomas Schelling³

“The greater the apparent threat from visible forms of pollution and the more vividly this can be dramatized, the more public support environmental improvement will receive and the longer it will sustain public interest. Ironically, the cause of ecologists would therefore benefit from an environmental disaster like a ‘killer smog’ that would choke thousands to death in a few days.”

—Anthony Downs⁴

INTRODUCTION

It is an understatement to say that in the last decade, a great deal of attention has been paid to terrorism and climate change. What unifies the two sets of risks is their potentially catastrophic quality.⁵ The attacks of 9/11 killed about three thousand people, an unquestionably large number; but other forms of terrorism, perhaps involving biological or nuclear weapons, could kill many more, conceivably a million people or more.⁶ Some of the worst-case scenarios associated with climate change involve many millions of deaths as a direct and indirect result of warmer temperatures.⁷ Human beings face a number of catastrophic risks, but terrorism and climate change rank among the most serious.

The two risks share an additional feature. It is not easy to assign probabilities to the worst-case outcomes. Officials cannot reasonably say that the risk of a catastrophic terrorist attack, in the next ten years, is

3. Thomas C. Schelling, *Intergenerational Discounting*, in *Discounting and Intergenerational Equity* 99, 101 (Paul R. Portney & John P. Weyant eds., 1999) [hereinafter Schelling, *Intergenerational Discounting*].

4. Anthony Downs, *Up and Down with Ecology—The “Issue Attention Cycle,”* 28 *Pub. Int.* 38, 46–47 (1972).

5. See, e.g., Robert E. Goodin, *What’s Wrong with Terrorism?* 119 (2006) (noting risk of a million deaths from efficient biological attack); Mark Maslin, *Global Warming* 83–101 (2004) (summarizing possible future impacts of global warming); William D. Nordhaus & Joseph Boyer, *Warming the World: Economic Models of Global Warming* 69–98 (2003) (estimating impacts of climate change); Richard A. Posner, *Catastrophe* 43–58, 75–86 (2005) (detailing risks of potential catastrophes including global warming and bioterror); Martin Rees, *Our Final Hour* 186 (2003) (“Our increasingly interconnected world is vulnerable to new risks; ‘bio’ or ‘cyber,’ terror or error.”).

6. See Goodin, *supra* note 5, at 119; Posner, *supra* note 5, at 75–86. For a skeptical view, see John Mueller, *Overblown: How Politicians and the Terrorism Industry Inflate National Security Threats, and Why We Believe Them* 13–28 (2006) (arguing that catastrophic risks associated with terrorism are quite low).

7. See Nordhaus & Boyer, *supra* note 5, at 78–83; Posner, *supra* note 5, at 43–58. An especially comprehensive treatment can be found in Nicholas Stern, *Stern Review: The Economics of Climate Change* 56 (2006), available at http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm (on file with the *Columbia Law Review*) (suggesting, for example, that one to three million more people will die from malnutrition at 3° C warming).

somewhere between (say) 5% and 30%. According to the One Percent Doctrine sketched by Vice President Cheney, a small chance of a disastrous harm deserves serious attention;⁸ the problem is rendered still more difficult by the fact that we may not know if the risk is 1%, or 5%, or 10%, or 20%. The same might well be true of climate change. On one, now-dated estimate, the risk of catastrophe, by the year 2100, is somewhere between 2% and 6%.⁹ But some people believe that we lack sufficient information to assign a probability to that risk; there are simply too many imponderables.¹⁰ In the domains of terrorism and climate change, nations might be thought to be operating in the domain of uncertainty rather than risk, in the sense that they are able to identify the worst outcomes without being able to specify the likelihood that they will occur.¹¹ Both terrorism and climate change, then, are potentially catastrophic risks where probabilities cannot easily be specified; they are also risks that are likely, if they do come to fruition, to affect many people at the same time.

My principal concern in this Essay is the stark difference between American reactions to terrorism-related risks and American reactions to the risks associated with climate change.¹² An explanation of this difference should cast light on the demand for risk-related law in general; it

8. Suskind, *supra* note 1, at 61–62.

9. See Nordhaus & Boyer, *supra* note 5, at 88, 90 (suggesting 1.2% probability of catastrophic impact with 2.5° C warming and 6.8% probability with 6° C warming). This estimate was obtained by starting with a survey of relevant experts, using the median answer, and adjusting that answer upwards in accordance with more recent information. See *id.* at 87–88. Under the circumstances, with so much uncertainty and rapidly changing data, there is no reason for confidence in the resulting figures. For reason to believe that the risk of catastrophic warming is serious, see *Avoiding Dangerous Climate Change* 7–23 (Hans Joachim Schellnhuber et al. eds., 2006). For a much more systematic effort to assess probabilities of bad outcomes, see Stern, *supra* note 7, at 152–65, 195.

10. See John Houghton, *Global Warming: The Complete Briefing* 178 (3d ed. 2004) (noting that “[t]he potential impact of climate change on human health could be large,” but that “the factors involved are highly complex; any quantitative conclusions will require careful study”); Maslin, *supra* note 5, at 97 (noting projection of potential increase in malaria exposure, by 2080s, of 260–320 million people); Posner, *supra* note 5, at 49 (noting scientific uncertainties with respect to magnitude and effects of climate change); Stern, *supra* note 7, at 152–62 (assessing probabilities and incorporating them into general account of costs of climate change).

11. For a lucid treatment, see Jon Elster, *Explaining Technical Change* 185–207 (1983) (discussing meaning of uncertainty and possible responses to it in context of energy choice and nuclear power). I am bracketing many complexities here. It is possible that the uncertainty is bounded, in the sense that experts can say, with some confidence, that the risk of catastrophic climate change is over 1% but below 40%; perhaps the same is true for terrorism. For present purposes, it is not necessary to explore these questions.

12. Other risks share some of the characteristics of terrorism and global warming. See generally Posner, *supra* note 5 (analyzing catastrophic risks associated with asteroid impacts, scientific accidents, bioweaponry, global warming, loss of biodiversity, and nuclear winter); Rees, *supra* note 5 (discussing natural and technological threats to Earth including, *inter alia*, asteroid impacts, “supereruptions,” greenhouse warming, terrorism, and scientific experiments gone awry). It would undoubtedly be illuminating to investigate

should also provide a useful test of competing accounts of how human beings think about social hazards. With respect to terrorism, the attacks of 9/11 are highly salient, in a way that is likely to lead people to perceive a strong likelihood of a future attack or perhaps to neglect the question of probability altogether, focusing instead on the worst that might happen. The public reaction is amplified by outrage, accompanied by the existence of an identifiable perpetrator in the form of Osama bin Laden and his allies.¹³ For these reasons, visceral reactions are likely to be intense. National officials, sometimes acting as worst-case entrepreneurs, have focused attention on the risk of terrorism, thus amplifying the effects of the salient incident and public outrage.

With respect to climate change, the situation is entirely different. 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.¹⁴ Climate change generally does not trigger strong emotions, and people are willing to consider whether significant harm is probable. The sources of climate change are obscure and multiple, and they lack faces; hence outrage, an amplifier with respect to public reactions to risk, is dampened or absent. To the extent that people understand that they are themselves contributors to climate change, they are inclined to diminish the magnitude of the threat. Americans believe that the most serious risks associated with climate change will occur in the long term and will be faced mostly by people in other nations. For these reasons, there is little in the way of visceral concern. It is possible that national leaders could nonetheless focus attention on the risk of climate change. But for the most part, they have not yet done so.

My goals here are positive, not normative. I do not mean to suggest any particular approach to the problems of terrorism and climate change, or to endorse any view about how to rank or compare the two problems. Those who believe that climate change is self-evidently the more serious problem might be tempted to explain the divergent reactions by reference to the power of well-organized interests in the United States, or some combination of selfishness, ignorance, and obtuseness on the part of those responsible for American law and policy. Those who believe that terrorism is self-evidently the more serious problem, and that climate change poses highly speculative risks for which it is appropriate to

American reactions to those risks as well. But the divergence explored here is especially striking, and a great deal of information is available with which to untangle the puzzle.

13. 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) (describing special hostility to, and desire to punish, identifiable perpetrators).

14. See Elke U. Weber, *Experience-Based and Description-Based Perceptions of Long-Term Risk: Why Global Warming Does Not Scare Us (Yet)*, 77 *Climatic Change* 103, 108–14 (2006) (exploring different pathways to fear of social hazards).

“wait and learn,”¹⁵ may find no puzzle at all. But whatever one’s view about the normative issues, the question of risk perception should have independent interest. As we shall see, it would be most surprising if judgments about risks of this kind were unerring or if they closely tracked expert opinion. The demand for risk regulation raises important puzzles of its own;¹⁶ and the supply is affected by the demand.

Although I do not explore the normative issues, there is a clear prescriptive implication: The United States is unlikely to take significant steps to reduce greenhouse gases unless the perceived costs of risk reduction are decreased, an available incident triggers fear of significant and relatively imminent harm, sustained analysis or influential leaders suggest that Americans face serious risks, or all three. With respect to depletion of the ozone layer, the United States played a pivotal role in spurring an effective worldwide response, partly because the costs of that response were perceived as low, partly because an available finding heightened public concern, and partly because sustained analysis suggested that the underlying risks were extremely serious.¹⁷ Altruistic or self-interested actors, in the private or public spheres, might well be able to enlist these points in any effort to increase the likelihood that the public will respond.

The remainder of this Essay comes in four parts. Part I briefly outlines American beliefs and practices. Part II explores the psychometric paradigm and affect, in an effort to see whether these accounts of risk perception explain the divergent American reactions. We shall see that while they provide some important clues, the divergence remains inadequately explained. Part III investigates the relationships among costs, benefits, and attitudes toward climate change and terrorism. The conclusion is that costs and benefits play a significant role, but that perceived costs and perceived benefits are more important, and that the perceptions cannot be explained without reference to behavioral factors. Finally, Part IV explores bounded rationality, with special attention to the role of the availability heuristic, probability neglect, outrage, and myopia. Attention is also devoted to cultural accounts of risk perception and to

15. See Robert Mendelsohn, Perspective Paper 1.1, in *Global Crises, Global Solutions* 44, 47 (Bjorn Lomborg ed., 2004) (arguing for little or no immediate action to control climate change). This position is challenged in many places, see, e.g., Houghton, *supra* note 10, at 227–30 (contending that immediate controls on greenhouse gases are justified); Stern, *supra* note 7, at vi–ix (describing economic consensus in favor of some kind of effort to reduce greenhouse gas emissions).

16. See George Loewenstein & Jane Mather, *Dynamic Processes in Risk Perception*, 3 *J. Risk & Uncertainty* 155, 161–65 (1990) (discussing relationship between risk perceptions and social realities).

17. See Cass R. Sunstein, *Of Montreal and Kyoto: A Tale of Two Protocols*, 31 *Harv. Envtl. L. Rev.* (forthcoming 2007) (manuscript at 15–16, on file with the *Columbia Law Review*) [hereinafter Sunstein, *Of Montreal and Kyoto*] (showing role of cost-benefit analysis in producing proregulatory posture of the United States).

possible developments that would make Americans more supportive of efforts to regulate greenhouse gases.

I. BELIEFS AND PRACTICES

With respect to climate change and terrorism, American beliefs and practices are complex and variable. Of course there is a degree of heterogeneity. The basic story, however, is relatively straightforward, and it reveals a sharp asymmetry in reactions to the two sets of risks.

A. Climate Change

1. *Actions.* — In terms of legal mandates, the U.S. government has done close to nothing to reduce the emission of greenhouse gases, relying largely on collecting information about emissions levels and encouraging further research.¹⁸ One of the nation's principal goals is an 18% improvement in greenhouse gas intensity between 2002 and 2012, with intensity measured as emissions per unit of gross domestic product (GDP).¹⁹ But this goal is an aspiration, not a requirement,²⁰ and in any

18. For overviews, see Daniel R. Abbasi, *Americans and Climate Change: Closing the Gap Between Science and Action* 20–23 (2006); Press Release, White House, Office of the Press Sec'y, *Climate Change Fact Sheet* (2005), available at <http://www.state.gov/g/oes/rls/fs/46741.htm> (on file with the *Columbia Law Review*) [hereinafter *Climate Change Fact Sheet*]; Press Release, White House, Office of the Press Sec'y, *President Bush Discusses Global Climate Change* (June 11, 2001), available at <http://www.whitehouse.gov/news/releases/2001/06/20010611-2.html> (on file with the *Columbia Law Review*); U.S. Envtl. Prot. Agency, *Climate Change*, at <http://epa.gov/climatechange/index.html> (last modified Oct. 23, 2006) (on file with the *Columbia Law Review*), and in particular the reports mentioned at U.S. Envtl. Prot. Agency, *Global Warming—Actions*, at <http://yosemite.epa.gov/oar/globalwarming.nsf/content/actions.html> (last modified Jan. 7, 2000) (on file with the *Columbia Law Review*). On June 22, 2005, a 53–44 majority of the United States Senate approved a “sense of the Senate” resolution to the effect that “Congress should enact a comprehensive and effective national program of mandatory market-based limits and incentives on greenhouse gases that slow, stop and reverse the growth of such emissions.” Abbasi, *supra*, at 20. The most aggressive legislative proposal, from Senators John McCain and Joseph Lieberman in 2003, would have capped greenhouse gas emissions at 2000 levels. The proposal was defeated by a vote of 55–43. For an overview, see Press Release, Senate Comm. on Commerce, Sci., & Transp., *Senate Casts Historic Vote on McCain-Lieberman Global Warming Bill* (Oct. 30, 2003), available at <http://commerce.senate.gov/newsroom/printable.cfm?id=214305> (on file with the *Columbia Law Review*). For an analysis, see generally Sergey Paltsev et al., *Emissions Trading to Reduce Greenhouse Gas Emissions in the United States: The McCain-Lieberman Proposal* (Mass. Inst. of Tech. Joint Program on Sci. & Pol'y Global Change, Report No. 97, 2003), available at http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt97.pdf (on file with the *Columbia Law Review*).

19. For a helpful outline, see Pew Ctr. on Global Climate Change, *Analysis of President Bush's Climate Change Plan*, at http://www.pewclimate.org/policy_center/analyses/response_bushpolicy.cfm (last visited Oct. 14, 2006) (on file with the *Columbia Law Review*).

20. See *id.*

case, significant reductions in greenhouse gas intensity can be accompanied by extremely large increases in greenhouse gas emissions.²¹

To be sure, substantial resources are being devoted to research.²² In 2005, over \$5 billion was appropriated for climate change programs and energy tax incentives; a 4.8% increase was planned for 2006.²³ Nearly \$2 billion has been appropriated specifically for the Climate Change Science Program, a multi-agency program designed to analyze existing trends and to explore possible solutions.²⁴ Since 1992, the Department of Energy has been required to estimate aggregate greenhouse gas emissions in the United States, and annual reports are available.²⁵ These estimates are mandated by the United Nations Framework Convention on Climate Change,²⁶ signed by the United States;²⁷ it is noteworthy that the Framework Convention includes no emissions reduction mandates, in large part because the United States resisted them.²⁸

One of the more ambitious current programs involves company-by-company reporting of actions taken to reduce greenhouse gas emissions, but this program itself remains voluntary,²⁹ in sharp contrast to the reporting requirements in other federal statutes.³⁰ Hence the United

21. This in fact has been the experience of the United States between 1990 and 2004, with significant reductions in greenhouse gas intensity (by 21%) accompanied by significant growth in carbon dioxide emissions (by 19%). Energy Info. Admin., U.S. Dep't of Energy, Emissions of Greenhouse Gases in the United States 2004, at xii (2005), available at <http://www.eia.doe.gov/oiaf/1605/ggrpt/pdf/057304.pdf> (on file with the *Columbia Law Review*).

22. See U.S. Global Change Research Program, at <http://www.usgcrp.gov> (last visited Nov. 13, 2006) (on file with the *Columbia Law Review*) (describing government-supported research regarding climate change).

23. See Climate Change Fact Sheet, *supra* note 18 (describing increase in funding over 2005 level).

24. *Id.*

25. Energy Info. Admin., *supra* note 21, at iii; U.S. Envtl. Prot. Agency, US Emissions Inventory 2006, at <http://yosemite.epa.gov/oar/globalwarming.nsf/content/resourcecenterpublicationsghgemissionsusemissionsinventory2006.html> (last modified Oct. 9, 2006) (on file with the *Columbia Law Review*).

26. United Nations Framework Convention on Climate Change, May 9, 1992, S. Treaty Doc. No. 102-38, 1771 U.N.T.S. 165.

27. United Nations Framework Convention on Climate Change, Kyoto Protocol Status of Ratification 7 (2006), available at http://unfccc.int/files/essential_background/convention/status_of_ratification/application/pdf/unfccc_ratification_22.11.06.pdf (on file with the *Columbia Law Review*).

28. Scott Barrett, Environment and Statecraft 368–69 (2003).

29. U.S. Dep't of Energy, Voluntary Reporting of Greenhouse Gases Under Section 1605(b) of the Energy Policy Act of 1992: General Guidelines (1994), available at <http://www.eia.doe.gov/oiaf/1605/1605b.html> (on file with the *Columbia Law Review*). For an example of a voluntary report from General Motors Corporation, see Gen. Motors Corp., Voluntary Reporting of General Motors Corporation United States Greenhouse Gas (GHG) Emissions for Calendar Years 1990–2002 (2003), at http://www.gm.com/company/gmability/environment/news_issues/news/ghgreport_2003.pdf (on file with the *Columbia Law Review*).

30. See 42 U.S.C. § 7651k (2000) (requiring monitoring and computing of aggregate annual total carbon dioxide emissions to be made available to public); *id.* § 13385(a)

States lacks a company-by-company Greenhouse Gas Inventory, comparable to the Toxic Release Inventory that has played such a large role in reducing toxic emissions.³¹ At the international level, the most aggressive program in which the United States now participates is the “methane to markets” agreement,³² but this agreement provides only a modest contribution to greenhouse gas abatement.³³ No regulatory limits are imposed on greenhouse gases from fossil fuels, motor vehicles, or any other source, notwithstanding efforts to require the national government to impose such limits.³⁴

To be sure, state and local governments have undertaken some action on their own. In December 2005, the governors of seven states signed a Memorandum of Understanding designed to create a regional “cap-and-trade” plan to reduce power plant emissions.³⁵ The mayors of over 350 cities, representing over 55 million Americans, have pledged to meet city-level goals corresponding with the requirements of the Kyoto Protocol.³⁶ In June 2005, Governor Arnold Schwarzenegger pledged to reduce California’s greenhouse gas emissions to 1990 levels by 2020,³⁷ a pledge that helped lead to the West Coast Governors’ Global Warming Initiative, which includes California, Washington, and Oregon.³⁸

(requiring inventory of national aggregate emissions of each greenhouse gas for each calendar year for baseline period of 1987 through 1990, updated annually).

31. See James T. Hamilton, *Regulation Through Revelation: The Origin, Politics, and Impacts of the Toxic Release Inventory Program 208–43* (2005) (offering detailed account of effect of Toxic Release Inventory).

32. See Methane to Mkts., Member Profile of the United States, at <http://www.methanetomarkets.org/partners/country/usa.htm> (last visited Oct. 15, 2006) (on file with the *Columbia Law Review*); U.S. Envtl. Prot. Agency, Methane to Markets Partnership, at <http://www.epa.gov/methanetomarkets/basicinfo.htm> (last updated Oct. 12, 2006) (on file with the *Columbia Law Review*).

33. See Energy Info. Admin., *supra* note 21, at tbl.ES2 (showing that methane is relatively small component of aggregate American contributions to climate change).

34. See *Massachusetts v. EPA*, 415 F.3d 50, 53 (D.C. Cir. 2005) (raising question of possible statutory obligation of EPA to regulate greenhouse gases from motor vehicles), cert. granted, 126 S. Ct. 2960 (2006).

35. See *Regional Greenhouse Gas Initiative: An Initiative of the Northeast & Mid-Atlantic States of the U.S.*, at <http://www.rggi.org> (last visited Oct. 15, 2006) (on file with the *Columbia Law Review*).

36. See Office of the Mayor, U.S. Mayors Climate Protection Agreement, at <http://www.seattle.gov/mayor/climate/> (last visited Jan. 13, 2007) (on file with the *Columbia Law Review*) (“As of January 10, 2007 358 mayors representing over 55 million Americans have accepted the challenge.”). For information on the Kyoto Protocol in general, see United Nations Framework Convention on Climate Change, at <http://unfccc.int/2860.php> (last visited Oct. 16, 2006) (on file with the *Columbia Law Review*) (providing official United Nations updates on climate change issues); Nordhaus & Boyer, *supra* note 5, at 145–66 (discussing effects of Kyoto Protocol on climate change and on economic variables).

37. Miguel Bustillo, *Gov. Vows Attack on Global Warming*, L.A. Times, June 2, 2005, at B1.

38. See Press Release, West Coast Governors’ Global Warming Initiative 1–3 (Nov. 18, 2005), available at http://www.ef.org/westcoastclimate/WC_Climate.pdf (on file with the *Columbia Law Review*).

California has enacted legislation to reduce emissions of greenhouse gases from automobiles, with a 22% reduction target by 2012 and a 30% reduction target by 2016.³⁹ In 2006, California took the most ambitious step to date by enacting legislation that would require statewide emissions to be capped at 1990 levels by 2020—a step that would require a 25% cut from the levels that would be expected without regulation.⁴⁰ These various initiatives go well beyond the actions of the national government, but even as a whole, they are projected to produce only modest emissions reductions in the United States.

2. *Public Opinion.* — The behavior of the national government is not inconsistent with the views of the American public, though those views are admittedly unstable and complex.⁴¹ On the one hand, a large majority of Americans (88%) were found as early as 2000 to favor the Kyoto Protocol.⁴² About 90% believed that the United States should reduce its greenhouse gas emissions; 79% supported an increase in fuel economy standards; and 77% favored government regulation of carbon dioxide as a pollutant.⁴³ In the same year, a slim majority (54%) also supported a tax on “gas guzzlers.”⁴⁴ In 2006, 61% supported restrictions on power plants designed to limit greenhouse gas emissions.⁴⁵

On the other hand, strong majorities were opposed to a gasoline tax (68%)⁴⁶ and to a business energy tax (60%) designed to reduce greenhouse gas emissions.⁴⁷ In 2000, the environment ranked only sixteenth among the most important problems in the nation, and indeed climate change was ranked twelfth of thirteen environmental issues (below urban sprawl).⁴⁸ Notwithstanding the vast publicity given to climate change in

39. Abbasi, *supra* note 18, at 21.

40. See Press Release, Gov. Schwarzenegger Signs Landmark Legislation to Reduce Greenhouse Gas Emissions (Sept. 27, 2006), available at <http://gov.ca.gov/index.php?/press-release/4111/> (on file with the *Columbia Law Review*).

41. See Anthony Leiserowitz, *Communicating the Risks of Global Warming: American Risk Perceptions, Affective Images and Interpretive Communities*, in *Communication and Social Change: Strategies for Dealing with the Climate Crisis* (S. Moser & L. Dilling eds., forthcoming) (manuscript at 5–12, on file with the *Columbia Law Review*) [hereinafter Leiserowitz, *Communicating*] (exploring role of affect in American risk perceptions); Anthony Leiserowitz, *Climate Change Risk Perception and Policy Preferences: The Role of Affect, Imagery, and Values*, 77 *Climatic Change* 45, 46 (2006) [hereinafter Leiserowitz, *Climate*] (same).

42. Leiserowitz, *Communicating*, *supra* note 41 (manuscript at 3). The United States has refused to ratify the Kyoto Protocol. See Robert V. Percival et al., *Environmental Regulation 1070–71* (4th ed. 2003). For a list of the 163 nations that have ratified the protocol, see United Nations Framework Convention on Climate Change, *Kyoto Protocol Status of Ratification*, *supra* note 27.

43. Leiserowitz, *Climate*, *supra* note 41, at 55.

44. *Id.*

45. ABC News/Time/Stanford Univ. Poll, Mar. 9–14, 2006, at <http://www.pollingreport.com/enviro.htm> (on file with the *Columbia Law Review*).

46. *Id.*

47. Leiserowitz, *Climate*, *supra* note 41, at 11.

48. Leiserowitz, *Communicating*, *supra* note 41 (manuscript at 4).

recent years, polls showed broadly similar conclusions in 2006, with Americans ranking the environment twelfth on a list of the most important problems, below immigration, health care, and gas and heating oil prices. Among environmental problems, climate change was ranked ninth, well below damage to the ozone layer (a problem that has long been handled through regulatory controls).⁴⁹ Another 2006 poll found that a large majority of Americans *oppose* an increase in taxes on electricity and gasoline as an attempt to reduce climate change.⁵⁰ In the same year, a different poll did find that 59% of Americans would support an increase in the gasoline tax to reduce the threat of climate change, but the magnitude of the increase was not specified.⁵¹

It seems clear that while Americans show some and perhaps increasing interest in the problem of climate change, they are not willing to sacrifice a great deal to reduce the associated risks. As we shall see in more detail below, most Americans do not believe that climate change poses a serious threat in the near future, and hence they do not think that they, or their friends and family members, face a real risk in the short term.⁵² Notably, citizens of many nations show more concern about climate change than Americans do; in 2003, higher levels of concern were found in Germany, Switzerland, Japan, Ireland, Great Britain, Mexico, Brazil, Portugal, Canada, Denmark, Norway, Chile, and Poland.⁵³ In 2001, citizens in Europe in general, and Britain in particular, ranked harms to the environment as the largest global threat, above poverty, natural disasters, famine, AIDS/HIV, and even war.⁵⁴ Indeed, a majority of Britons (63%), polled in 2004, ranked climate change as the most important environmental issue in the world.⁵⁵ In the same year, terrorism was ranked as the “most serious threat to the future wellbeing of the world” by 48% of those polled, but global warming came in second, at 25%, about double the number for population growth and AIDS/HIV.⁵⁶ It is an understatement to say that the issue of climate change has far less salience in the United States. In 2006, Americans were found to have a lower level of concern about climate change than citizens of the fourteen other nations involved; significantly higher rates of concern

49. See Andrew C. Revkin, Yelling “Fire” on a Hot Planet, *N.Y. Times*, Apr. 23, 2006, § 4, at 1 (summarizing Gallup survey of American concerns).

50. ABC News/Time/Stanford Univ. Poll, *supra* note 45.

51. See *N.Y. Times/CBS News Poll 2*, Feb. 22–26, 2006, at http://environment.about.com/gi/dynamic/offsite.htm?zi=1/XJ&sdn=environment&z=http%3A%2F%2Fwww.nytimes.com%2Fpackages%2Fpdf%2Fnational%2F20060228_poll_results.pdf (on file with the *Columbia Law Review*).

52. See *infra* notes 113–121 and accompanying text.

53. See Steven R. Brechin, Comparative Public Opinion and Knowledge on Global Climatic Change and the Kyoto Protocol: The U.S. Versus the World?, 23 *Int’l J. Soc. & Soc. Pol’y* 106, 110 (2003).

54. See Andrew Norton & John Leaman, *The Day After Tomorrow: Public Opinion on Climate Change 4* (2004) (showing different nations’ attitudes toward climate change).

55. *Id.* at 5.

56. *Id.* at 6.

were shown in Russia, Spain, Nigeria, Japan, India, France, Pakistan, and Turkey, among others.⁵⁷

To be sure, Americans are relatively supportive of programs that, as they perceive it, do not impose costs on the public but instead on some such abstraction as “companies” or “power plants.”⁵⁸ But when the costs are direct, and are seen as requiring out-of-pocket expenditures, their enthusiasm for legal controls on greenhouse gases diminishes dramatically.

3. *Emissions.* — What are the consequences of legal practices and social beliefs for greenhouse gas emissions? Perhaps unsurprisingly, such emissions have been increasing in the United States in the very period in which climate change has received attention both domestically and abroad. Greenhouse gas emissions increased by no less than 15.8% between 1990 and 2004.⁵⁹ In 1990, carbon dioxide emissions were 5,002.3 million metric tons; in 2004, they were 5,973.0 million metric tons, a jump of 19%.⁶⁰ To be sure, greenhouse gas intensity has indeed been decreasing in the same period, with a significant decline of 21%.⁶¹ But because of increased energy usage, per capita emissions have actually increased over this period by 1.2%—an increase that, alongside population growth, produced the increase in aggregate emissions.⁶²

Fossil fuel combustion is by far the largest contributor to greenhouse gas emissions in the United States, accounting for 98% of carbon dioxide emissions.⁶³ While methane emissions were reduced by 10% from 1990 to 2004, greenhouse gas emissions from fossil fuels have been growing in most sectors, with total emissions increasing by 1.7% in 2004 alone—among the largest increases on record from any nation.⁶⁴ All the principal sectors—which include residential, commercial, industrial, and transportation-related uses—remain free from national regulation. By contrast, substantial reductions in greenhouse gas emissions, between 1990 and 2003, can be found in Bulgaria, Estonia, Latvia, the Czech Republic, Lithuania, Hungary, Poland, Russia, Ukraine, Iceland, Luxembourg, the United Kingdom, Sweden, and Germany.⁶⁵

57. Stern, *supra* note 7, at 465.

58. ABC News/Time/Stanford Univ. Poll, *supra* note 45.

59. See Energy Info. Admin., *supra* note 21, at ix; Larry West, Record Increase in U.S. Greenhouse Gas Emissions Sparks Global Controversy, Apr. 19, 2006, at <http://environment.about.com/b/a/256722.htm> (on file with the *Columbia Law Review*).

60. Energy Info. Admin., *supra* note 21, at x, xii.

61. *Id.* at xii.

62. *Id.*

63. *Id.* at x–xii.

64. *Id.* at xii.

65. See United Nations Framework Convention on Climate Change, Key GHG Data 16–17 (2005), available at http://unfccc.int/resource/docs/publications/key_ghg.pdf (on file with the *Columbia Law Review*). These figures must, however, be taken with many grains of salt. Notably, several countries show emissions increases comparable to or higher than those of the United States. These include Canada (24.2%), New Zealand (22.5%), Australia (23.3%), Austria (16.5%), Greece (25.8%), Ireland (25.6%), Portugal (36.7%),

B. *Terrorism*

With terrorism, the picture is very different. After the 9/11 attacks, the risk of terrorism has been consistently ranked among the most pressing problems facing the United States.⁶⁶ It is an understatement to say that the American government has taken massive steps to reduce terrorism-related risks. The most expensive are almost certainly the wars in Afghanistan and Iraq, undertaken in large part to reduce those risks. The war in Iraq has been extremely costly. As of September 2005, \$212 billion had been allocated from the U.S. Treasury, and aggregate costs were estimated at \$255 billion to the United States, \$40 billion to coalition partners, and \$134 billion to Iraq, for a total global cost of \$428 billion.⁶⁷ As of September 2006, the appropriations were \$318.5 billion⁶⁸—ensuring that the cost of the Iraq War, to the United States, has now surpassed the total expected cost of the Kyoto Protocol, which on plausible assumptions would have been \$325 billion.⁶⁹ There is a great deal more in the way of costly activity related to the war on terror, including new legislation⁷⁰ and numerous regulations.⁷¹

With respect to particular measures to combat terrorism, Americans disagree on a great deal. But they agree that the risk of terrorism is both serious and real, and they favor expensive precautions to reduce that risk.

Spain (41.7%), and Italy (11.5%). Collapses in the Eastern European economies led to significant decreases in greenhouse gas emissions, and most of Western Europe is not close to meeting its targets under the Kyoto Protocol. On the relevant facts, and on domestic self-interest and greenhouse gas reductions, see Sunstein, *Of Montreal and Kyoto*, supra note 17 (manuscript at 31–34).

66. In 2006, for example, 45% of Americans said that they worried “a great deal” about the possibility of future terrorist attacks, the same percentage that worried about “crime and violence,” and a higher percentage than worried about the economy, hunger and homelessness, and the environment. Gallup Poll, Mar. 13–16, 2006, at <http://www.pollingreport.com/prioriti.htm> (on file with the *Columbia Law Review*).

67. See Scott Wallsten & Katrina Kosec, *The Iraq War: The Economic Costs*, Milken Inst. Rev., Sept. 2006, at 16, 18.

68. Nat. Priorities Project, *Cost of Iraq War Rises Higher for American Taxpayers 1 n.1*, Sept. 2006, at http://nationalpriorities.org/auxiliary/maps_files/iraqsept06/US.pdf (on file with the *Columbia Law Review*).

69. See Nordhaus & Boyer, supra note 5, at 161. This cost estimate might turn out to be inflated if replacements for carbon dioxide have a diminishing cost as a result of technological innovation. *Id.*

70. For an overview, see Nat’l Conference of State Legislatures, *Homeland Security and Emergency Preparedness*, at <http://www.ncsl.org/programs/press/2002/pdcongress.htm> (last visited Oct. 15, 2006) (on file with the *Columbia Law Review*). The most prominent enactments include the USA Patriot Act of 2001, Pub. L. No. 107-56, 115 Stat. 272 (codified as amended in scattered sections of 12, 15, 18, 22, 28, 42, 49, & 50 U.S.C.), the Aviation and Transportation Security Act of 2001, Pub. L. No. 107-71, 115 Stat. 597 (codified as amended in scattered sections of 49 U.S.C.), and the Air Transportation Safety and System Stabilization Act of 2001, Pub. L. No. 107-42, 115 Stat. 230 (codified as amendment at 49 U.S.C. § 40101 note (Supp. III 2005)).

71. For an early catalogue, see Office of Mgmt. & Budget, *Draft Report to Congress on the Costs and Benefits of Federal Regulations*, 67 Fed. Reg. 15,013, 15,015–15,018 (Mar. 28, 2002).

In 2006, the Pew Research Center found that defending the nation from terrorism was a “top priority” for 80% of Americans—a higher percentage than for any other problem.⁷² In the period shortly after the 9/11 attacks, 88% of Americans believed that it was either very likely or somewhat likely that there would be “another terrorist attack . . . within the next few months”—with about half of Americans worrying about the possibility that a family member might “become a victim of a terrorist attack,” and over 40% worrying that “terrorist attacks might take place where [they] live or work.”⁷³

Later studies have continued to show a high level of concern, with many people believing that an imminent attack is likely.⁷⁴ In July 2005, nearly half of respondents described themselves as “somewhat” or “very” worried that they, or someone in their family, would be a victim of terrorism.⁷⁵ More than half also said that it was somewhat or very likely that there would be a terrorist attack in the United States “over the next several weeks.”⁷⁶ In 2006, there was actually an increase, from the year before, in the percentage of Americans saying that they were “very worried or somewhat worried” that they or someone in their family would “become a victim of terrorism.”⁷⁷ There can be little doubt that the level of concern is lower now than it was in the immediate aftermath of the 9/11 attacks, and that public fear will leap after any future attack. But whatever emerges from any particular slice in time, it is clear that Americans believe that they face a serious threat of a terrorist attack in the not-distant future and that they and their loved ones are at risk. Americans are willing to support substantial measures to reduce the threat.

C. *Beliefs and Regulation*

The divergent public judgments about climate change and terrorism help to account for governmental behavior. Of course there are many possible relationships between public attitudes and government responses. For a general orientation, consider the following table:

72. Pew Research Center Survey, Jan. 4–8, 2006, at <http://www.pollingreport.com/prioriti.htm> (on file with the *Columbia Law Review*).

73. See Program on International Policy Attitudes, Americans and the World, at http://www.americans-world.org/digest/global_issues/terrorism/terrorism_perception.cfm (last visited Oct. 15, 2006) (on file with the *Columbia Law Review*).

74. A 2002 study, involving students at Harvard University, found a “best estimate” mean of 294 deaths from terrorism in the next year, with an “upper bound” best estimate of 25,691. See W. Kip Viscusi & Richard J. Zeckhauser, Sacrificing Civil Liberties to Reduce Terrorism Risks, 26 *J. Risk & Uncertainty* 99, 108–11 (2003). Interestingly, the median upper bound estimates of “total fatalities due to all terrorism” were lower than the median upper bound estimates of “total fatalities due to airplane terrorism”—a finding to which I will return. *Id.*

75. USA Today/CNN/Gallup Poll, July 22–24, 2005, at <http://www.usatoday.com/news/polls/2005-07-25-july-poll.htm> (on file with the *Columbia Law Review*).

76. *Id.*

77. See Mueller, *supra* note 6, at 2.

TABLE 1: THE DEMAND FOR RISK REDUCTION

	Officials want risk reduction	Officials do not want risk reduction
Public demands risk reduction	War on terror after 9/11	Superfund legislation (governing abandoned hazardous waste dumps); restrictions on the pesticide Alar
Public does not demand risk reduction	Controls on ozone-depleting chemicals; acid deposition regulation	Controls on greenhouse gases; airline security before 9/11

We can easily imagine cases in which both the public and its representatives favor risk reduction, especially if the focus is on worst-case scenarios. After the attacks of 9/11, this was certainly the case with respect to the war on terror. The same can plausibly be said about certain steps to reduce air pollution.⁷⁸ In other contexts, the public does not demand risk reduction, but officials favor it; they are permitted to take certain steps because the public as a whole does not oppose them, and electoral retribution is unlikely. This was the case with respect to controls on acid deposition.⁷⁹ With respect to controls on ozone-depleting chemicals, the public did not exactly demand regulation, but there was considerable public interest in it, and officials acted in a way that conformed to public concern.⁸⁰

Very different issues arise when the public demands some kind of regulatory response even though officials would not favor it on their own. This was plausibly the case with respect to the Superfund statute, designed to regulate abandoned hazardous waste sites. The publicity given to the supposed disaster at Love Canal made a statutory response almost inevitable, even if many officials did not favor it either publicly or privately.⁸¹ The same category probably includes the public demand for

78. See Hamilton, *supra* note 31, at 177–91 (exploring role of public opinion cycles in spurring enactment and enforcement of legislation involving toxic release reporting); E. Donald Elliott, Bruce A. Ackerman & John C. Millian, *Toward a Theory of Statutory Evolution: The Federalization of Environmental Law*, 1 *J.L. Econ. & Org.* 313, 327–28 (1985) (exploring electoral competition, between President Nixon and Senator Muskie, to claim credit for aggressive air pollution regulation).

79. See Kevin Esterling, *The Political Economy of Expertise* 114–60 (2004) (showing how expertise, in particular on question of emissions trading, contributed to enactment of acid deposition provisions of Clean Air Act). For a parallel story with respect to ozone-depleting chemicals, see generally Richard Benedick, *Ozone Diplomacy* (1991). The evidence here is more complicated because a substantial segment of the public supported controls on such chemicals. *Id.*

80. See Sunstein, *Of Montreal and Kyoto*, *supra* note 17 (manuscript at 8–9) (exploring public concern about ozone depletion in United States and Europe and corresponding importance officials placed on ozone issues).

81. See Timur Kuran & Cass R. Sunstein, *Availability Cascades and Risk Regulation*, 51 *Stan. L. Rev.* 683, 691–98 (1998) (contending that public concern about abandoned hazardous waste dumps far outstrips scientific evidence of their harm); Matthew E. Kahn, *Environmental Disasters as Regulation Catalysts? The Role of Bhopal, Chernobyl, Exxon-*

some kind of response to the health hazards allegedly associated with the pesticide Alar.⁸² The final category consists of cases in which the public does not demand risk reduction at the same time that officials do not want it. This category includes aggressive security measures in airports before the attacks of 9/11.⁸³ It is also a plausible account of the recent situation with respect to climate change. In both cases, of course, the wishes of the public and its representatives did not match the views of most experts.⁸⁴

Of course these stylized categories ignore important variations. We can identify cases in which the public does not merely fail to demand risk reduction, but would affirmatively punish risk reduction efforts. Aggressive security measures at airports before 9/11 would probably have fallen in this category, simply because such measures would have been deemed a significant and unnecessary inconvenience—justified, if at all, in response to a highly speculative threat. In 2000, almost all travelers lacked experience with terrorism, and hence the risk seemed at best unlikely and abstract; any effort to impose restrictions of the sort that have now become customary would have seemed ludicrously invasive. Where citizens would face a large burden from risk reduction, there is a built-in obstacle to risk reduction, and bad outcomes or worst-case scenarios will be ignored or downplayed. Citizens would almost certainly resist a large increase in the gasoline tax, even if the increase were defended by reference to environmental concerns, the interest in energy self-sufficiency, or some combination of the two.

We might be able to imagine cases in which many or most officials would seek to block regulation even if the public demands it. At the very least, officials might insist on a more tepid, less costly, and more symbolic response than the public would like. In the aftermath of public concern about toxic releases from chemical plants, for example, the legislative response involved disclosure requirements, not regulatory controls.⁸⁵ We

Valdez, Love Canal, and Three Mile Island in Shaping U.S. Environmental Law 1–42 (2006) (unpublished manuscript, on file with the *Columbia Law Review*) (exploring role of Love Canal disaster in leading to legislation).

82. See Percival et al., *supra* note 42, at 387–93 (offering account of Alar incident); Aaron Wildavsky, *But Is It True?* 201–22 (1995) (discussing Alar scare and suggesting that fears were not justified by reality). The ultimate response was a voluntary removal of Alar from the market, after the EPA issued a “preliminary determination to cancel all food uses” of the substance. Percival et al., *supra* note 42, at 391.

83. See Max H. Bazerman & Michael D. Watkins, *Predictable Surprises* 15–41 (2004) (exploring factors leading to little in way of airport security precautions before 9/11).

84. On airport security, see *id.*; on climate change, see, e.g., Stern, *supra* note 7, at vi–ix (noting consensus that some kind of international response to climate change is desirable).

85. Hamilton notes:

[Congress] insert[ed] a reporting provision in the broader hazardous waste bill. The Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) established the initial set of chemicals, industries, and facilities that would have to provide the EPA with yearly reports on their toxic releases and transfers. The

could also imagine cases in which the public helps to spur regulation, perhaps through consumer behavior that reduces its ultimate cost, but in a way that does not exactly conflict with the desires of officials.

Importantly, the category of “officials” contains a great deal of diversity. In the table above, the term is meant to refer to those with some kind of formal position, and thus includes mayors, governors, presidents, national and state legislators, and bureaucrats in various levels of government. As we have seen, there may well be disagreements or even conflicts among state and national governments; and career bureaucrats may well differ from elected officials, as indeed they have in the domains of both national security and climate change. In addition, the public is hardly monolithic. Internal divisions within the citizenry can greatly complicate the political economy of risk reduction, not least when well-organized private groups ensure that government responses take their preferred form. In the context of terrorism, the airline industry played a significant role in preventing more extensive security procedures before 9/11.⁸⁶ There can be no doubt that powerful organizations have helped to discourage aggressive measures to control greenhouse gas emissions.⁸⁷

There is an additional consideration. The public demand for regulatory controls is not simply a brute fact. Public opinion is affected by the acts of both officials and well-organized groups. It shifts over time, often in response to the statements and actions of influential people in private and public institutions. Risk-related campaigns, in the private and public sectors, might diminish or heighten public concern with respect to terrorism and climate change. Indeed, such campaigns might manipulate the very variables that I shall be emphasizing here. The level of concern with terrorism would inevitably have been high in the aftermath of the attacks of 9/11. But it would have been possible for leaders to dampen that concern, especially as time passed, by (for example) giving assurances that the risk was low and attempting to assimilate terrorism-related risks to

legislation also marked the first time that Congress required an agency to create a publicly accessible electronic database

Hamilton, *supra* note 31, at 5.

86. See Bazerman & Watkins, *supra* note 83, at 26–31, 128–29 (suggesting that “the U.S. airline industry successfully resisted government-mandated aviation security improvements for decades, through its lobbying and campaign funding”).

87. With respect to research, see Posner, *supra* note 5, at 53–57 (including suggestion that research of many “global warming skeptics” has been “financed by the energy industries” and “may not be very good research”). With respect to regulation, see Lee Lane, *The Political Economy of U.S. Greenhouse Gas Controls*, in *Punctuated Equilibrium and the Dynamics of U.S. Environmental Policy* 162, 165–66 (Robert Repetto ed., 2006) [hereinafter *Punctuated Equilibrium*] (suggesting that powerful interest groups have discouraged regulation of greenhouse gases); Robert Repetto, Introduction, in *Punctuated Equilibrium*, *supra*, at 1, 17 (noting role of powerful private groups in climate change debate).

those encountered in ordinary life.⁸⁸ To say the least, American leaders did not take this course, with President George W. Bush pointing to worst-case scenarios and emphasizing instead that we are “still not safe” and that ours is “a Nation in danger.”⁸⁹ By contrast, some nations, including Israel, have to some extent “normalized” terrorism-related risks. It is well known that in response to certain deadly or troublesome incidents, tourists often react far more strongly than do people who regularly live in the affected area.⁹⁰

To be sure, a degree of normalization may be easier with respect to suicide bombers, whose destructive acts are fairly localized, than with respect to airplanes that fly into tall buildings, killing thousands of people. But for the war on terror, prominent officials have played a large role in activating and intensifying public concern, increasing the salience of the 9/11 attacks and invoking those attacks to stress the need for protective measures. Whether or not they are justified, such measures can themselves help to form both beliefs and desires. Aggressive security measures at airports, for example, may well serve to intensify public fear, in a way that can heighten the demand for further precautions.

With respect to climate change, the most influential national leaders in the United States have taken a quite different course. Far from activating concern, they have attempted to dampen it, if only by failing to say much about the problem. Of course there are limits to the malleability of public opinion, and we shall see that terrorism is far more likely to trigger visceral fear than is climate change. But it is possible to imagine a situation in which the objective facts were the same, but in which American leaders increased concern about climate change but decreased concern about terrorism, to the point where the divergent attitudes were not quite so divergent, at least after the lapse of several years post-9/11. Hence the divergence is a product not only of simple facts, above all the 9/11 attacks, but also of political responses to both sets of risks. It is easily imaginable that influential leaders could take steps to heighten concern about climate change in the years to come, perhaps by offering vivid narratives of potential harm.

88. For a general argument in this direction, see Mueller, *supra* note 6, at 148–53 (arguing that politicians should seek to reduce anxiety about terrorism and put risks in context).

89. Goodin, *supra* note 5, at 166.

90. See generally Thomas E. Drabek, *Disaster Evacuation Behavior: Tourists and Other Transients* (1996) (examining evacuation behavior and identifying factors related to behavioral variations between tourists and residents).

II. THE PSYCHOMETRIC PARADIGM AND AFFECT

A. *Qualitative Factors and Risk*

The “psychometric paradigm” has become one of the most influential accounts of risk perception in the social sciences,⁹¹ including law.⁹² The goal of the psychometric paradigm is to explain the divergence between the risk-related judgments of experts and those of ordinary people. A major conclusion is that ordinary people show a “richer” rationality than that of experts, who focus on quantities alone.⁹³ On this view, most people are attuned to far more than the number of lives at stake. They pay attention as well to a range of qualitatively distinctive factors, not reducible to mere numbers. For example, people are influenced by whether a risk is potentially catastrophic, faced by future generations, involuntarily incurred, uncontrollable, delayed rather than immediate, and particularly dreaded.⁹⁴ The psychometric paradigm purports to explain why people are so fearful of the risks associated with pesticides, herbicides, and nuclear power—risks that do not greatly concern experts.⁹⁵ The psychometric paradigm also claims to explain why people are not much concerned about the risks associated with automobiles and x-rays—risks that many experts believe to be far from trivial.⁹⁶ When ordinary people show a greater concern with nuclear power than with x-rays, it is because the former poses risks that are delayed, involuntarily incurred, potentially catastrophic, unfamiliar, and faced by future generations.⁹⁷

The psychometric approach can certainly claim to account for heightened social concern with terrorism, which is likely to trigger the standard grounds for “richer rationality.” The risks associated with terrorism are particularly dreaded, and such risks have the uncontrollable, unfamiliar, and potentially catastrophic qualities that are said to produce intense reactions. But can the psychometric paradigm adequately explain the asymmetrical reactions to terrorism and climate change? At first glance, it cannot. Indeed, it would be reasonable to say that if the psychometric paradigm is right, then climate change should have a high priority, perhaps even higher than terrorism. The risks associated with

91. See Cross-Cultural Risk Perception: A Survey of Empirical Studies (Ortwin Renn & Bernd Rohrman eds., 2000); Paul Slovic, Perception of Risk [hereinafter Slovic, Perception Essay], in *The Perception of Risk* 220, 222 (Paul Slovic ed., 2000) [hereinafter Slovic, Perception of Risk] (outlining psychometric paradigm).

92. Clayton P. Gillette & James E. Krier, Risk, Courts, and Agencies, 138 U. Pa. L. Rev. 1027, 1061–85 (1990) (defending idea of competing rationalities).

93. See Slovic, Perception Essay, *supra* note 91, at 231.

94. See Baruch Fischhoff et al., How Safe Is Safe Enough? A Psychometric Study of Attitudes Toward Technological Risks and Benefits, in Slovic, Perception of Risk, *supra* note 91, at 80, 99. For a discussion and critique, see Howard Margolis, Dealing with Risk 99–119 (1997) (contending that psychometric factors do not, in fact, account for divergence between lay and expert risk perceptions).

95. Slovic, Perception Essay, *supra* note 91, at 143–46.

96. *Id.*

97. See *id.* at 143–52.

climate change are certainly delayed rather than immediate, and they are imposed directly on subsequent generations, which might face catastrophe. At least as much as terrorism, the risks associated with climate change are involuntarily incurred and uncontrollable.⁹⁸ Such risks also raise serious equitable concerns, since they will be faced by especially vulnerable people in poor nations,⁹⁹ as well as in developed nations.¹⁰⁰ Along the dimensions identified by the psychometric paradigm, climate change and terrorism might be expected to trigger roughly equivalent public concern. From the standpoint of the psychometric approach, it could not easily be predicted that terrorism would trigger a greater reaction than climate change.

B. *The Affect Heuristic*

More recently, those interested in the psychometric paradigm have explored the “affect heuristic”—a heuristic that is said to determine risk-related thoughts and behavior.¹⁰¹ On this view, people have rapid, immediate reactions to persons, activities, and processes, and the immediate reaction operates as a mental shortcut for a more deliberative or analytic assessment of the underlying issues.¹⁰² Much of this work emphasizes the existence of two families of cognitive operations, sometimes described as System I and System II, with which risky activities and processes are evaluated.¹⁰³ System I is rapid, intuitive, and error-prone; System II is more deliberative, calculative, slower, and more likely to be error-free. Heuristic-based thinking is rooted in System I; it is subject to override, under certain conditions, by System II.¹⁰⁴ System I may, for example, lead peo-

98. On some of the difficulties here, see Cass R. Sunstein, *Risk and Reason* 58–72 (2002) (attempting to explain puzzles raised by these ideas).

99. See *Climate Change and Africa passim* (Pak Sum Low ed., 2006) (exploring distinctive risks faced by Africa); Thomas Schelling, *Strategies of Commitment* 34–35 (2006) (concluding that “most, nearly all, of the adverse effects of likely climate change will accrue to the descendants of those living today in what we call ‘developing countries’”). The most sustained discussions are J. Timmons Roberts & Bradley C. Parks, *A Climate of Injustice: Global Inequality, North-South Politics, and Climate Policy* (2007), and Stern, *supra* note 7, at 82–84, 92–115.

100. Stern, *supra* note 7, at 131.

101. See Melissa L. Finucane et al., *The Affect Heuristic in Judgments of Risks and Benefits* [hereinafter *Finucane, Affect Heuristic*], in Slovic, *Perception of Risk*, *supra* note 91, at 413.

102. *Id.* at 414–15.

103. *Id.* at 414.

104. See Daniel Kahneman & Shane Frederick, *Representativeness Revisited: Attribute Substitution in Intuitive Judgment*, in *Heuristics and Biases: The Psychology of Intuitive Judgment* 49, 51–52 (Thomas Gilovich et al. eds., 2002) (exploring two systems). The two systems need not be seen as occupying different physical spaces; they might even be understood as heuristics (!). See *id.* There is, however, some evidence that different sectors of the brain can be associated with Systems I and II. See the discussion of fear in Joseph LeDoux, *The Emotional Brain* 128–34 (1996), and the more general treatment in Matthew D. Lieberman, *Reflexive and Reflective Judgment Processes: A Social Cognitive Neuroscience Approach*, in *Social Judgments* 44, 47–51 (Joseph P. Forgas et al. eds., 2003).

ple to be fearful of flying, or of large dogs, but System II might create a deliberative check, ensuring an eventual conclusion that the risks are trivial. So too, System I might reflect little reason for concern about (say) sunbathing, but System II might lead people to avoid undue exposure to the sun for fear of skin cancer.

Considerable evidence suggests that immediate affective reactions do help to explain people's judgments about risks. When asked to assess the risks and benefits associated with certain items, people tend to say that risky activities contain low benefits, and that beneficial activities contain low risks.¹⁰⁵ Hence it may well be that "affect" comes first, and helps to direct judgments of both risk and benefit. In support of this hypothesis, note that when subjects are asked to make their assessments under time pressure, the inverse correlation between risks and benefits is increased—a finding that strongly suggests that an affect heuristic, and System I, are at work.¹⁰⁶ Consider also the fact that when people learn about the low risks of an item, they are moved to think that the benefits are high—and when they learn about the high benefits of an item, they are moved to think that the risks are low.¹⁰⁷ In these ways, judgments about risks can be connected with "the halo effect," which predicts that "the favorability of the overall impression of an attitude object is a good predictor of how strongly positive or negative qualities are ascribed to the object."¹⁰⁸

It is tempting to think that the affect heuristic helps to explain the asymmetry between terrorism and climate change. For many Americans, the idea of terrorism conjures up intense images of disaster, as the idea of climate change does not.¹⁰⁹ In general, "many of the climate change risks may not be as viscerally unsettling to people as one might think."¹¹⁰ Even if people believe that terrorism-related risks are not greater, as a statistical matter, than those associated with climate change, their affective reactions to the former are likely to be far more intense than their affective reactions to the latter. The claim seems right; the idea of terrorism typically does produce more intense emotions than the idea of climate change. The problem is that this difference itself remains to be explained. Affect is not simply given; it has sources. In this context, use

105. Finucane, *Affect Heuristic*, supra note 101, at 415–16.

106. *Id.*

107. *Id.*

108. *Id.* at 426. Compare student course evaluations. Among teachers, it is informal lore that when a particular class likes the instructor, the evaluation of all enumerated items will improve, including such items as course materials, even when they stay constant from year to year. For an entertaining example of a halo effect, see Brian Wansink, *Mindless Eating* 21–24 (2006) (showing that people given wine labeled "California" much liked meal that was not much liked by people who were given wine labeled "North Dakota," even though meal and wine were identical).

109. See Leiserowitz, *Communicating*, supra note 41 (manuscript at 8) (concluding from study that Americans find climate change to be "moderate risk").

110. Abbasi, supra note 18, at 26.

of the affect heuristic appears to be as much a redescription of different public reactions as an explanation of those differences.

It is not impossible to imagine a society, not unrecognizably different from our own, in which the affect heuristic leads to much greater concern with climate change than with terrorism, or at least equivalent concern. If events related to climate change were familiar and salient, and if events related to terrorism were not, the divergence in reactions would run in a different direction. Indeed, there is no need to use our imagination. Among some groups, climate change already does produce extremely intense concern, probably equal to or greater than that associated with terrorism.¹¹¹ I will explore this point below;¹¹² for the moment, let us turn to a more conventional account of risk perception.

III. BENEFITS, COSTS, AND RATIONAL CHOICE

I shall be arguing that identifiable features of bounded rationality help to explain the divergent American reactions to terrorism and climate change. But no one denies that most people engage in at least some kind of weighing of benefits and costs. If citizens believe that they have much to gain and little to lose from risk regulation, they will favor risk regulation; leaders should be expected to respond to what citizens believe, and their own judgments are influenced by an intuitive kind of cost-benefit analysis as well. Perhaps the cost-benefit ratio is simply perceived to be better for certain reductions of terrorist threats than for aggressive efforts to reduce the risks associated with climate change. Of course many people believe that the United States has moral obligations to poorer nations, which are distinctly threatened by climate change. But perhaps moral obligations are insufficient to motivate expensive regulatory requirements. If so, those interested in imposing those requirements must speak in other terms.

Let us see, then, whether it is possible to explain the divergent American reactions to terrorism and climate change by reference to widespread judgments about benefits and costs.

A. *Benefits*

Americans might well believe that they have far more to gain from efforts to reduce the risks of terrorism than from efforts to reduce the risks of climate change. Perhaps bad or catastrophic worst-case scenarios are more likely for the former than for the latter. To be sure, much depends on the specific measures that are proposed. But the simplest claim here would be that even if significant climate change is already occurring,

111. See Dan M. Kahan et al., *Fear of Democracy: A Cultural Evaluation of Sunstein on Risk*, 119 *Harv. L. Rev.* 1071, 1085–87 (2006) (reviewing Cass R. Sunstein, *Law of Fear: Beyond the Precautionary Principle* (2005)) (discussing “influence of cultural world view on perceptions of environmental risks”).

112. See *infra* notes 246–252 and accompanying text.

its harmful effects will not be significant in the United States.¹¹³ That claim is contested, to be sure; but if Americans doubt the risk of serious harm, they might well resist significant or costly regulatory responses. In the face of such doubts, some people have argued that the best response to existing concerns involves continued research, especially if little is to be gained by acting now rather than a few years from now.¹¹⁴

With respect to terrorism, by contrast, it is difficult to say that the risk is not real or that it is too speculative to warrant immediate action. To be sure, particular risk-reduction strategies might be questioned—on the ground, for example, that certain surveillance programs will not have significant effects, or that some steps increase risks on balance.¹¹⁵ But it is hard to argue that with respect to terrorism, the best approach is one of “learn, then act.”

Current evidence strongly suggests that Americans believe that they have relatively little to gain from efforts to control climate change. In 2006, a large majority of Americans said both that climate change is “already happening” and that climate change does not pose a “serious threat” to them or their way of life in their lifetime.¹¹⁶ In 2006, another poll found that two-thirds of Americans believe that climate change will not create a serious danger in their lifetime.¹¹⁷ In 2000, a sample of people was asked, “Which of the following are you *most* concerned about? The impacts of global warming on . . . (1) you and your family; (2) your local community; (3) the U.S. as a whole; (4) people all over the world; (5) non-human nature; or (6) not at all concerned.”¹¹⁸ Nearly 70% of

113. See Olivier Deschenes & Michael Greenstone, *The Economic Impacts of Climate Change: Evidence from Agricultural Profits and Random Fluctuations in Weather* 32 (2006), at <http://www.aei-brookings.org/admin/authorpdfs/page.php?id=1237&PHPSESSID=abaca07c15515533a459adcedc81fcd3> (on file with the *Columbia Law Review*) (finding that effect on American agriculture might actually be favorable). Compare this to the suggestion in Nordhaus & Boyer, *supra* note 5, at 97, that “the economic impact of gradual climate change (that is, omitting catastrophic outcomes) is close to zero for a moderate (2.5° C) global warming.” A more recent and different view is sketched in Stern, *supra* note 7, at 130 (offering optimistic and pessimistic cases for United States, with pessimistic case involving loss of 1.2% GDP for 3° C warming and noting that pessimistic case does not take full account of effects of extreme weather events, such as hurricanes). Note that this conclusion does not come to terms with the economic effects on the United States that would come from the very fact of serious economic harms in other nations.

114. See Mendelsohn, *supra* note 15, at 44–47 (arguing that it may well make sense to wait before instituting aggressive controls); Nordhaus & Boyer, *supra* note 5, at 98 (same). This conclusion is vigorously challenged in Houghton, *supra* note 10, at 227–30 (arguing for immediate action); Stern, *supra* note 7, at 193, 202–03 (arguing that ten-year delay could make it impracticable to stabilize emissions at desirable level).

115. For a superb discussion, see generally Jessica Stern & Jonathan Wiener, *Precaution Against Terrorism*, 9 *J. Risk Res.* 393 (2006) (exploring risks created both by terrorism and by precautions against terrorism).

116. Gallup Poll, *supra* note 66.

117. See Lydia Saad, Gallup News Serv., *Americans Still Not Highly Concerned About Global Warming*, Apr. 7, 2006 (on file with the *Columbia Law Review*).

118. Leiserowitz, *Communicating*, *supra* note 41 (manuscript at 5–6).

respondents answered (4) or (5), and only 13% answered (1) or (2). It is thus apparent that in the recent past, Americans have generally thought that they are not themselves at risk as a result of climate change.¹¹⁹ In their view, the principal risks are faced by those in other nations, or future generations, or by the environment in general.¹²⁰ Thus the health effects of climate change are not believed to be large enough to motivate behavior.¹²¹

Compare in this regard a cross-national study of perceptions of risk associated with terrorism.¹²² Americans estimated their *personal* chance of serious harm from terrorism in the next year as 8.27%—to say the least, a significant risk. For obvious reasons, the objective risks from terrorism are difficult to calculate, but the figure seems wildly inflated.¹²³ To the extent that Americans believe that they do face a risk of 8.27%, they will readily support aggressive protective measures. Recall here the evidence that substantial numbers of Americans are worried about the risk that a terrorist attack will affect themselves, or their loved ones, in the near future.

There is thus reason to believe that Americans think that they have far more to gain from controls on terrorism than from controls on climate change; the personal risk, to those now living, is perceived as much higher from terrorism than from climate change. Some specialists offer supportive findings. For example, a respected study finds that extremely little would be lost by a ten-year delay in emissions reductions.¹²⁴ Perhaps this judgment is wrong.¹²⁵ But even if it is wrong, current doubts about the personal benefits of climate change policies help to explain divergent public reactions. The pattern of regulation is influenced by this fact.

B. *Costs*

Perhaps those who show greater concern with terrorism believe, at least intuitively, that the costs of reducing climate change are likely to be

119. See Abbasi, *supra* note 18, at 144 (“A greater focus on how the consequences of climate change brush up against the lives and values of those who have so far been indifferent or opposed to action is critical to creating a larger base of concern.”).

120. For a contrary view, see U.S. Global Change Research Program, *Climate Change Impacts on the United States* (2000), available at <http://www.usgcrp.gov/usgcrp/Library/nationalassessment/overviewconclusions.htm> (on file with the *Columbia Law Review*).

121. See Abbasi, *supra* note 18, at 190.

122. See generally Neal Feigensohn et al., *Perceptions of Terrorism and Disease Risks: A Cross-National Comparison*, 69 *Mo. L. Rev.* 991 (2004) (studying American and Canadian risk perceptions with respect to terrorism and SARS).

123. See Cass R. Sunstein, *The Case for Fear*, *New Republic*, Dec. 11, 2006, at 29 (offering statistics suggesting that risk of dying in terrorist attack is, or at least has been, very low).

124. See Nordhaus & Boyer, *supra* note 5, at 127 (describing potential net economic loss as “trivially small”).

125. See Stern, *supra* note 7, at 193, 208.

very high—plausibly higher than the costs of reducing the risk of terrorism. Or perhaps Americans oppose significant steps to control climate change to the extent that the costs are high. When the costs are visible, the argument for responding to the problem is weakened, and people are likely to seek extremely good evidence that it is worth worrying about the underlying risks.

To be sure, cost comparisons are difficult in the abstract. Here as elsewhere, everything depends on the particular steps at issue. The war in Iraq, motivated in large part by the risk of terrorism, has been extremely expensive, easily exceeding \$350 billion for the United States alone.¹²⁶ As I have noted, the cost of the Iraq War to the United States is now greater than the total expected cost of the Kyoto Protocol, and before long the cost of the Iraq War will dwarf that expected cost.¹²⁷ At the same time, it is possible to imagine modest steps to control greenhouse gases that would not be terribly expensive.¹²⁸ But perhaps significant reductions in the risk of terrorism can be undertaken at reasonable cost, and perhaps the same is not true of climate change. On this view, the divergent public reactions reflect a kind of informal cost-benefit analysis, in accordance with which an awareness of the magnitude of the costs is doing a great deal of work.

There is almost undoubtedly something to this explanation. If the risk of climate change could be significantly reduced for \$10 million, or with an annual tax increase of \$1 on every American, much more would be done to combat climate change. As we shall see, American enthusiasm for the Montreal Protocol offers strong evidence on this count.¹²⁹ A demonstration that climate change could be reduced at low cost would undoubtedly increase American enthusiasm for risk reduction efforts.¹³⁰ Note in this regard that in the abstract, Americans broadly support the Kyoto Protocol and strong efforts to combat climate change—but their enthusiasm sharply diminishes as they are asked to incur costs to reduce greenhouse gas emissions. In the context of terrorism, people may well believe that they are themselves unlikely to incur significant costs from

126. See Linda Bilmes & Joseph Stiglitz, *The Economic Costs of the Iraq War: An Appraisal Three Years After the Beginning of the Conflict 1* (Nat'l Bureau of Econ. Research, Working Paper No. 12054) (on file with the *Columbia Law Review*) (noting that by November 2005 Congress has already appropriated approximately \$251 billion for military operations in Iraq); National Priorities Project, at http://nationalpriorities.org/index.php?option=com_wrapper&Itemid=182 (last visited Jan. 16, 2007) (on file with the *Columbia Law Review*) (reporting cost in excess of \$359 billion on January 16, 2007).

127. See *supra* text accompanying note 69.

128. The methane program is an example. See *supra* note 32 and accompanying text.

129. See *infra* note 259 and accompanying text.

130. Note that proponents of the McCain-Lieberman proposal, which would have capped greenhouse gas emissions in the United States at 2000 levels, emphasized a study purporting to show relatively low costs from full implementation. See Paltsev et al., *supra* note 18, at 26–27.

risk reduction efforts—except, perhaps, in the form of increased waiting lines at airports.

Consider the recorded views of Americans about environmental protection and climate change in the late 1990s. Sixty-three percent of Americans agreed with the following statement: “Protecting the environment is so important that requirements and standards cannot be too high and continuing environmental improvements must be made regardless of cost.”¹³¹ In the same general vein, 59% supported the Kyoto Protocol, with only 21% opposed.¹³² But in the same period, 52% of Americans said that they would refuse to support the Kyoto Protocol if it would cost an extra \$50 per month for an average American household.¹³³ In fact only 11% of Americans would support the Kyoto Protocol if the monthly expense were \$100 or more.¹³⁴ As I have noted, polls find that Americans are skeptical of increased energy and gasoline taxes designed to reduce climate change—though they do favor regulatory mandates on power companies.¹³⁵ How can we explain strong majority support for “environmental improvements . . . regardless of cost” and strong majority rejection of environmental improvements when the cost is high?¹³⁶

The answer lies in the fact that people are not, in fact, willing to spend an infinite amount for environmental improvements. When the costs are placed squarely “on screen,” people begin to weigh both costs and benefits, and their enthusiasm for regulatory expenditures diminishes.¹³⁷ Hence Americans believe that car companies should be required to take steps to reduce greenhouse gas emissions, without also being willing to spend a great deal, if anything, in increased gasoline prices. Surveys in Europe suggest that significant numbers of citizens are willing to pay something to reduce the risks of climate change; but even there, the amount is not extremely high.¹³⁸ Among all people between the ages of 15 and 64, only about 20% are willing to pay more for gasoline to reduce environmental harm, and among that group, the average willingness to pay is an increase of 2.3%, or 11.5 cents per liter.¹³⁹ For citizens as well as leaders, an intuitive assessment of costs and benefits plays a large role in determining the level of precautions actually sought.

131. See Program on Int'l Pol'y Attitudes, *Americans on the Global Warming Treaty* 17–18 & fig.14, available at http://www.pipa.org/OnlineReports/ClimateChange/GlobalWarming_Nov00/GlobalWarming_Nov00_rpt.pdf (last updated Feb. 4, 2000) (on file with the *Columbia Law Review*).

132. *Id.* at 10–11 & fig.7.

133. *Id.* at 18–19 & fig.15.

134. *Id.*

135. See *supra* notes 46–50 and accompanying text.

136. Program on Int'l Pol'y Attitudes, *supra* note 131, at 18 & fig.14.

137. For a detailed discussion of this point in connection with risk perception, see Margolis, *supra* note 94, at 124–31.

138. See, e.g., W. Kip Viscusi & Joni Hirsch, *The Generational Divide in Support for Climate Change Policies: European Evidence*, 77 *Climatic Change* 121, 124–25 (2006).

139. *Id.*

Return here to the government's decision, in the 1990 Clean Air Act, to take extremely aggressive steps to control acid deposition.¹⁴⁰ Those steps became possible only after the creation of an ambitious emissions trading program reduced the anticipated costs of emissions controls; hence those who would otherwise be inclined to oppose the program found it acceptable.¹⁴¹ There is a similar pattern with American enthusiasm for steps to decrease depletion of the ozone layer.¹⁴²

C. American Costs, Foreign Benefits

According to some prominent estimates, the most serious damage from climate change is not likely to be felt in the United States.¹⁴³ On some estimates, American agriculture will actually be a net winner as a result of climate change.¹⁴⁴ On other estimates, Americans as a whole will be net losers, but not nearly to the same extent as other nations.¹⁴⁵ These estimates fit public perceptions, for Americans believe that other nations have more to lose from climate change than the United States does. American behavior is likely to be much affected by any finding that citizens in other nations have much more to gain from regulatory protection than Americans do. Consider the fact that a "revealed preference" study of American taxation and foreign aid suggests that a citizen of the poorest nations is valued at 1/2000 an American life.¹⁴⁶ If Americans believe that people in India and South Africa, rather than Florida and New York, are at serious risk, they will be far less likely to act.

Some of the most systematic analyses suggest that the United States stands to lose much more, and to gain much less, from aggressive regula-

140. For an overview, see A. Denny Ellerman et al., *Markets for Clean Air* 253–96 (2000) (showing that trading program greatly reduced anticipated and actual costs).

141. See *id.*; Esterling, *supra* note 79, at 128–29.

142. See Sunstein, *Of Montreal and Kyoto*, *supra* note 17 (manuscript at 4) (showing that favorable cost-benefit ratio helped ensure American support for Montreal Protocol).

143. See Nordhaus & Boyer, *supra* note 5, at 96–97; Stern, *supra* note 7, at 93–99, 128–31.

144. Compare Deschenes & Greenstone, *supra* note 113, *passim* (finding that climate change might actually help American agriculture), with the suggestion in Nordhaus & Boyer, *supra* note 5, at 97, that "the economic impact of gradual climate change (that is, omitting catastrophic outcomes) is close to zero for a moderate (2.5° C) global warming." Note that this conclusion does not come to terms with the economic effects on the United States that would result from the very fact of serious economic harms in other nations; such harms might well adversely affect the United States as well, among other things because of a reduction in the demand for goods and services produced here.

145. See Nordhaus & Boyer, *supra* note 5, at 91 (showing that United States will lose far less, as percentage of GDP, than India and African nations, from 2.5° C warming); Stern, *supra* note 7, at 130 (offering optimistic and pessimistic projections for United States).

146. See Wojciech Kopszuk et al., *The Limitations of Decentralized World Redistribution: An Optimal Taxation Approach*, 49 *Eur. Econ. Rev.* 1051, 1054 (2005).

tion than European nations do.¹⁴⁷ For the United States, the likely costs of the Kyoto Protocol have been projected to exceed its likely benefits, with a total cost of \$325 billion.¹⁴⁸ The picture for the world as a whole is mixed but more promising, with Europe anticipated to be a net gainer, and with Russia likely to gain an especially large amount.¹⁴⁹ Hence those nations that favor aggressive controls on greenhouse gases, and that have shown enthusiasm for the Kyoto Protocol, are responding in large part to the fact that they can expect to gain a great deal and to spend relatively little. Indeed, almost all Eastern European nations have easily met their obligations under the Kyoto Protocol, in large part because their emissions allowances greatly exceeded their likely emissions in any case.¹⁵⁰ The Kyoto Protocol was supported by many nations for which its requirements were not expected to be burdensome.¹⁵¹ When the costs are so low, regulation will seem attractive if leaders and citizens are even mildly concerned about the risks of climate change.

At the present time, some people believe that the United States will be able to handle the costs of climate change,¹⁵² and hence that expensive precautions are hard to justify simply from the standpoint of national self-interest. If this is so, then intuitive cost-benefit balancing helps to explain the source of the official position of the United States. The key point is that aggressive regulation seems, to many, to be a kind of foreign aid program,¹⁵³ one that is not self-evidently in the national self-interest. Of course the problem of terrorism is not comparable to climate change on this count. While efforts to control terrorism are likely to benefit other nations, the principal goal is to protect the United States itself.

147. Stern, *supra* note 7, at 93–99, 128–31 (describing effects for various nations and regions and showing comparatively less, though still significant, vulnerability for United States).

148. Nordhaus & Boyer, *supra* note 5, at 161. I am not taking this particular number as canonical; of course technologies change, and it is possible that any particular projection will be inflated. I refer to this number as suggestive of the general perception that significant reductions in greenhouse gas emissions will be costly for the United States.

149. *Id.* at 161–63.

150. See Kyoto Protocol to the United Nations Framework Convention on Climate Change 20 (1998), available at <http://unfccc.int/resource/docs/convkp/kpeng.pdf> (on file with the *Columbia Law Review*) (listing emissions limitations for each country as percentage of 1990 emissions); United Nations Framework Convention on Climate Change, Key GHG Data, *supra* note 65, at 16–17 (listing annual CO₂ emissions of various countries from 1990 to 2003).

151. Richard E. Benedick, *Morals and Myths: A Commentary on Global Climate Policy*, WZB-Mitteilungen, Sept. 2005, at 15, 15–16 [hereinafter Benedick, *Morals and Myths*].

152. See, e.g., Deschenes & Greenstone, *supra* note 113, at 2 (estimating that “climate change will lead to \$1.1 billion (2002\$) or 3.4% increase in annual agricultural sector profits”).

153. In principle, this understanding seems doubtful, in part because the United States is responsible for a large part of the problem. If climate change is seen as a kind of tort committed by wealthy nations against poor ones, the notion that greenhouse gas abatement is “foreign aid” will seem far less plausible.

D. *Present Costs, Future Benefits*

Perhaps the real difference lies in the *temporal* incidence of costs and benefits.¹⁵⁴ Consider the following question: “Do you think climate change is an urgent problem that requires immediate government action, or a longer-term problem that requires more study before government action is taken?” More Americans believe that the problem is “longer-term” than “urgent.”¹⁵⁵

For climate change, it is both tempting and reasonable to believe that the largest costs of risk reduction will be felt immediately, whereas the benefits will be received mostly by those in the future. Whatever their stated moral commitments, current citizens may turn out to be unwilling to pay a great deal to help those who will follow them. Perhaps current citizens are rationally discounting the future, believing that harms in fifty years do not deserve the same attention as harms today.¹⁵⁶ Perhaps citizens are assuming that if risks will not be incurred for several or many decades, they might not be incurred at all, simply because technological advances will provide a solution. Perhaps they are using an implausibly high discount rate to assess future benefits.¹⁵⁷ Perhaps they are being unrealistically optimistic, or reducing cognitive dissonance, believing that a probabilistic harm in the future will not come to fruition at all, or will not be particularly bad if it does. Or they might be simply self-interested, treating future generations as a kind of foreign country. Thomas Schelling expressly argues that “[g]reenhouse gas abatement is a foreign aid program, not a saving-investment problem of the familiar kind.”¹⁵⁸ And if political actors are responsive to their citizens, it is most unlikely that they will impose high current costs for long term gains. By the time the largest benefits of risk reduction are generally felt by the public, those politicians will be out of office and indeed long dead.

Here, then, is a substantial difference between the risk of terrorism and the risk of climate change. Every politician has a strong political as well as personal incentive to take steps to prevent terrorist attacks. If such an attack occurs “on his watch,” the likelihood of political reprisal is high. The risk of such an attack is immediate. By contrast, the political incentives to attend to the long-term risk of climate change are much weaker. It is far less likely that there will be a climate change “incident” on the

154. See Bazerman & Watkins, *supra* note 83, at 84–87, 238–39 (emphasizing that delayed nature of climate change risk diminishes public demand for regulatory controls).

155. See ABC News/Washington Post Poll, Sept. 23–27, 2005, at <http://www.pollingreport.com/enviro.htm> (on file with the *Columbia Law Review*) (stating that 47% of respondents believe global warming is “longer-term” problem, whereas 41% believe it to be an “urgent” problem).

156. For a good but technical discussion of discounting, see Stern, *supra* note 7, at 43–52.

157. On the underlying issues, see *Discounting and Intergenerational Equity* (Paul R. Portney & John P. Weyant eds., 1999); Symposium, *Homo Economicus, Homo Myopicus, and the Law and Economics of Consumer Choice*, 73 *U. Chi. L. Rev.* 1 (2006).

158. Schelling, *Intergenerational Discounting*, *supra* note 3, at 99–100.

watch of, or easily attributable to, any current politician.¹⁵⁹ To justify public concern, or the imposition of immediate costs, such a politician must trigger moral commitments, which may not be so easy to do. If moral commitments do not operate as an impetus for costly controls, a politician who attempts to regulate greenhouse gases might be imposing visible and significant costs on current voters for the benefit of future people who will never be able to reward that particular politician with their electoral support. Such politicians might well be heroic, but it might well be surprising to see heroes of that particular sort.

E. *Rational Choice? A Summary and Some Doubts*

We now seem to have the ingredients of a plausible explanation of the divergent American reactions to terrorism and climate change. With respect to climate change, the benefits of aggressive regulation are plausibly disputed and the costs are plausibly high, certainly for the United States. The benefits are likely to be enjoyed disproportionately by other nations and not in the near future. The analysis is very different for terrorism, where Americans appreciate the worst-case scenarios, perceive themselves as peculiarly at risk, and believe that the benefits of risk reduction will be felt largely in the United States and by current generations. For some efforts to reduce the risk of terrorism, it is certainly possible to question whether the benefits justify the costs; but the judgment, intuitive or more reflective, is that many expensive measures are worthwhile.

But this explanation is not adequate. Recall that on September 10, 2001, terrorism was far from a high priority item for Americans—and that the year before the attacks, literally 0% of the public counted terrorism as the nation's leading problem!¹⁶⁰ By contrast, many specialists believed, for a period preceding the attack, that the risk of terrorism was foolishly neglected in light of a rational assessment of costs and benefits—and hence that the attacks were a kind of “predictable surprise.”¹⁶¹ On this view, the neglect was a product of “unavailability bias,” in which the absence of cognitively available incidents of harm made people unreasonably indifferent to the risk. Note in this regard that in the eighteen months following the 9/11 attacks, between 15% and 30% of the public continued to name terrorism as the nation's most important problem—and the “fluctuations closely track[ed] the frequency of television news stories concerning terrorism.”¹⁶² Here, too, is a tribute to the power of the availability heuristic.

159. Hurricane Katrina is a possible exception, in light of efforts to connect its magnitude with global warming. But those efforts failed, and the failures are instructive: It is bound to be difficult to connect particular weather-related events with global warming in general.

160. See Goodin, *supra* note 5, at 135.

161. See Bazerman & Watkins, *supra* note 83, at 15–18.

162. Goodin, *supra* note 5, at 135.

Perhaps the post-9/11 reaction is simply a form of rational updating on the part of Americans; the attacks themselves certainly provided information about the immediacy and magnitude of the threat. With respect to ordinary citizens, this account is not implausible.¹⁶³ But as an explanation of the behavior of the United States, much more was almost certainly involved, because officials had the information to justify more aggressive security measures well before 9/11.¹⁶⁴ To understand the missing ingredients, it is necessary to venture well beyond a simple analysis of costs and benefits, and to say something about the nature of human cognition.

IV. BOUNDEDLY RATIONAL FEAR

It would certainly be optimistic to suppose that risk perception, and responses to the dangers associated with terrorism and climate change, are generally a product of rational balancing of costs and benefits. With respect to terrorism, vivid and concrete images play a large role in people's judgments. The very idea of terrorism conjures up the attacks of 9/11, or perhaps even worse. Climate change is entirely different. It might well produce no images at all. According to one study, "most Americans lacked vivid, concrete, and personally-relevant affective images of climate change, which helps explain why climate change remains a relatively low priority national or environmental issue."¹⁶⁵ This finding provides an important clue to risk perception in general; it also casts a distinctive light on the divergent American reactions to terrorism and climate change.

Judgments about risks come from two different pathways.¹⁶⁶ Sometimes people's judgments are rooted in their own experience. Has a bad outcome come to fruition in the recent past? Has that outcome been experienced personally, as in an encounter with violent crime or serious illness? If an outcome has not been experienced personally, has an occurrence nonetheless been highly visible and salient? Alternatively, judgments might emerge from statistical accounts of one kind or another. People might learn, for example, that a shift to a better diet can decrease a risk of heart disease by a certain amount, or that a reduction in sulfur dioxide emissions is likely to reduce asthma attacks by a specified percentage, or that decreased sun exposure is likely to decrease the risk of skin cancer.

People's judgments are affected by both of these pathways, but personal experience is typically far more effective in motivating behavior.

163. For a skeptical view, see Mueller, *supra* note 6, at 1–3 (arguing Americans are overly fearful of terrorism given small probabilities involved).

164. See Nat'l Comm'n on Terrorist Attacks upon the U.S., *The 9/11 Commission Report* 255–77 (2004), available at <http://www.9-11commission.gov/report/911Report.pdf> (on file with the *Columbia Law Review*) (describing increased level of reporting in intelligence community of potential security threats in months before 9/11).

165. Leiserowitz, *Climate*, *supra* note 41, at 55.

166. See Weber, *supra* note 14, at 106–08.

And when direct personal experience is lacking, vivid images of harm can operate as a surrogate for actual experience. Recall the earlier discussion of the two families of cognitive operations, System I and System II.¹⁶⁷ System I might well be triggered by easily accessible images, even when people have not faced the relevant risks in daily life.

For many Americans, the idea of terrorism conjures up intense images of disaster, as the idea of climate change does not.¹⁶⁸ Indeed, White House officials under President Bush asked executive officials to use the term “climate change” in preference to “global warming,” evidently with the belief that “climate change” is abstract and relatively neutral—though even the idea of “global warming” does not appear especially frightening.¹⁶⁹ (Maybe warmer is better?) In the United States, the high salience of the 9/11 attacks made the relevant harms easy to imagine and in an important sense quite personal. Even if people could be convinced that terrorism-related risks are not greater, as a statistical matter, than those associated with climate change, their affective reactions to the former would likely be far more intense than their affective reactions to the latter.

Of course affective responses are not simply given; they have sources. Before the attacks of 9/11, Americans were not worried much about terrorism, and among some groups, climate change does produce intense concern, almost certainly equal to or greater than that associated with terrorism. To understand why this is the exception rather than the rule, we need to offer some details about why, exactly, terrorism generally produces an acute reaction and climate change generally does not.

A. *The Availability Heuristic*

1. *Availability in General.* — It is well established that in thinking about risks, people rely on certain heuristics, or rules of thumb, which serve to simplify their inquiry.¹⁷⁰ Heuristics typically work through a process of “attribute substitution,” in which people answer a hard question by substituting an easier one.¹⁷¹ Should Americans be fearful of hurricanes, nuclear power, mad cow disease, alligator attacks, or avian flu? When people use the availability heuristic, they assess the magnitude of risks by asking whether examples can readily come to mind.¹⁷² For example, “a

167. See *supra* Part II.B.

168. Cf. Abbasi, *supra* note 18, at 26 (“[M]any of the climate change risks may not be as viscerally unsettling to people as one might think.”).

169. See Weber, *supra* note 14, at 106 (“[T]he Bush White House has instructed its departments and agencies to use the more neutral term ‘climate change’ instead of ‘global warming.’”).

170. 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) (exploring role of heuristics in people’s judgments about probability).

171. See Kahneman & Frederick, *supra* note 104, at 49, 53–60.

172. See Tversky & Kahneman, *supra* note 170, at 3, 11–14.

class whose instances are easily retrieved will appear more numerous than a class of equal frequency whose instances are less retrievable.”¹⁷³ If people can easily think of relevant examples, they are far more likely to be frightened and concerned than if they cannot. Consider a simple study showing people a list of well-known men and women, and asking them whether the list contains more names of women or more names of men. In lists in which the men were especially famous, people thought that there were more names of men, whereas in lists in which the women were the more famous, people thought that there were more names of women.¹⁷⁴

This is a point about how *familiarity* can affect the availability of instances. A risk that is familiar, like that associated with terrorism in the aftermath of 9/11, will be seen as more serious than a risk that is less familiar, like that associated with sunbathing or hotter summers. But *salience* is important as well. “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.”¹⁷⁵ Thus vivid and easily imagined causes of death (e.g., tornadoes) receive likelihood estimates that are similar to those of less vivid causes (e.g., asthma attacks) that occur with a far greater frequency (here a factor of 20).¹⁷⁶ So too, recent events will have a greater impact than earlier ones.

Consider here a study of how people are affected by their personal experience with low probability events.¹⁷⁷ When the rare events actually did occur, they had a far larger impact on people’s decisions than could be justified by objective analysis. But most of the time, people’s behavior was less affected by the possibility of those events than an objective analysis warranted. The reason was that the events were, by definition, rare—and not having encountered them, people concluded that such events could be ignored. On the basis of personal experience, then, the pattern was one of simultaneous overreaction and underreaction to rare events—with the former occurring in the immediate aftermath of personal experience.

The point helps explain differences across time and space in much risk-related behavior, including both public and private decisions to take precautions. If floods have not occurred in the immediate past, people who live on flood plains are far less likely to purchase insurance.¹⁷⁸ Whether people will buy insurance for natural disasters is greatly affected

173. *Id.* at 11.

174. *Id.*

175. *Id.*

176. See Sarah Lichtenstein et al., Judged Frequency of Lethal Events, 4 J. Experimental Psychol.: Hum. Learning & Memory 551, 555, 556–57 tbl.2 (1978).

177. Elke U. Weber et al., Predicting Risk-Sensitivity in Humans and Lower Animals: Risk as Variance or Coefficient of Variation, 111 Psychol. Rev. 430 (2004).

178. *Id.*

by recent experiences.¹⁷⁹ In the aftermath of an earthquake, insurance for earthquakes rises sharply—but it declines steadily from that point, as vivid memories recede.¹⁸⁰

What, in particular, produces availability? An illuminating essay, with important implications for divergent reactions to terrorism and climate change, attempts to test the effects of ease of *imagery* on perceived judgments of risk.¹⁸¹ The study asked subjects to read about an illness (Hyposcencia-B) that “was becoming increasingly prevalent” on the local campus.¹⁸² In one condition, the symptoms were vague and hard to imagine, involving an inflamed liver, a malfunctioning nervous system, and a general sense of disorientation. In another condition, the symptoms were concrete and easy to imagine—involving muscle aches, low energy, and frequent severe headaches. Subjects in both conditions were asked to imagine a three-week period in which they had the disease and to write a detailed description of what they imagined. After doing so, subjects were asked to assess, on a ten-point scale, their likelihood of contracting the disease. The basic finding was that likelihood judgments were very different in the two conditions, with easily imagined symptoms making people far more inclined to believe that they were likely to get the disease.

The importance of the availability heuristic emerges from a cross-national study of perceptions of risk associated with terrorism and SARS.¹⁸³ Americans perceived terrorism to be a far greater threat, to themselves and to others, than SARS; Canadians perceived SARS to be a greater threat, to themselves and to others, than terrorism.¹⁸⁴ Canadians estimated their chance of serious harm from SARS as 7.43%, significantly higher than their estimate for terrorism (6.04%).¹⁸⁵ Americans estimated their risk of serious harm from terrorism as about four times as high as their estimate of their risk of serious harm from SARS (2.18%).¹⁸⁶ These findings are understandable in light of the fact that Canadians have experienced no incidents of terrorism but a significant number of

179. See Paul Slovic, *Cognitive Processes and Societal Risk Taking*, in Slovic, *Perception of Risk*, supra note 91, at 40 (“[I]ndividuals ‘are strongly conditioned by their immediate past and limit their extrapolation to simplified constructs, seeing the future as a mirror of the past.’” (quoting Robert W. Kates, *Hazard and Choice Perception in Flood Plain Management* 88 (1962))).

180. *Id.*

181. Steven J. Sherman et al., *Imagining Can Heighten or Lower the Perceived Likelihood of Contracting a Disease: The Mediating Effect of Ease of Imagery*, in *Heuristics and Biases: The Psychology of Intuitive Judgment* 98 (Thomas Gilovich et al. eds., 2002).

182. *Id.* at 99.

183. See Feigenson et al., supra note 122, at 995–99 (summarizing results of student survey).

184. *Id.* at 995.

185. *Id.* at 996.

186. *Id.*

cases of SARS—whereas Americans have experienced a serious terrorist attack but no cases of SARS.¹⁸⁷

Note that the use of the availability heuristic, in these contexts, is hardly irrational.¹⁸⁸ What has happened before seems, much of the time, to be the best available guide to what will happen again. The problem is that the availability heuristic can lead to significant errors, in terms of both excessive fear and neglect. The problem of neglect is especially serious when citizens face a potentially catastrophic low-probability risk that has not come to fruition in the recent past.¹⁸⁹

2. *Availability, Terrorism, and Climate Change.* — If the availability heuristic plays a large role in people's risk-related judgments, then we might have a simple explanation for the asymmetry in American reactions: Because of the attacks of 9/11, an available incident drives people's probability judgments with respect to terrorism, whereas there is no such incident with respect to climate change. The vividness and salience of the incident helps to ensure continuing concern about terrorism-related risks. The worst-case scenarios, or at least some bad case scenarios, are easily brought to mind.

To see the point, consider what would happen if in 2000, a candidate for public office had made the risk of terrorism a central issue in a political campaign. Such a candidate would likely have seemed to have an odd sense of priorities—focusing on a distant and apparently unrealistic threat, one that could not possibly have resonated in the minds of voters. Or suppose that in 2000, a member of Congress had aggressively argued for much of the same legislation that followed the attacks of 9/11, including increased security measures at airports and new presidential authority to find and to detain suspected terrorists. There is no question that Congress would have rejected any such effort; indeed, a legislator who argued for it would probably have seemed to be an alarmist and a threat to civil liberties, perhaps even a crank. In 2000, the public was no more focused on terrorism-related risks than on the risks associated with climate change. The attacks of 9/11 made all the difference.

The point is quite general. Risk-reduction legislation is often fueled by identifiable crises, bringing worst-case scenarios vividly to mind. Legis-

187. *Id.* at 995.

188. Tversky and Kahneman emphasize that the heuristics they identify “are highly economical and usually effective,” but also that they “lead to systematic and predictable errors.” Tversky & Kahneman, *supra* note 170, at 20. Gerd Gigerenzer, among others, has emphasized that some heuristics can work extremely well. See generally Gerd Gigerenzer, *Adaptive Thinking: Rationality in the Real World* (2000) (discussing success of several heuristics); Gerd Gigerenzer et al., *Simple Heuristics That Make Us Smart* (1999) (same). He has used this point as a rejoinder to those who stress the errors introduced by heuristics and biases. For present purposes, it is not necessary to take a stand on the resulting debates. Even if many heuristics mostly work well in daily life, a sensible government can do much better than to rely on them.

189. See Bazerman & Watkins, *supra* note 83, at 91–93 (discussing effects of vividness of information).

lation calling for disclosure of toxic releases was spurred by a chemical accident at Bhopal, India, which “focuse[d] media attention on chemical safety and stimulated Congress members to introduce right-to-know legislation.”¹⁹⁰ The relevant legislation could not possibly have been enacted without the highly publicized Bhopal disaster.¹⁹¹ Corporate Average Fuel Economy (CAFE), requiring fuel economy for motor vehicles, was a product of the Arab oil embargo and the nationally publicized “energy crisis”; without the crisis, the fuel economy legislation would have been unimaginable.¹⁹² The international effort to reduce ozone-depleting chemicals was spurred by the publicity given to a large ozone “hole” over Antarctica.¹⁹³

Often the available incidents are a product of presentations by influential actors. *Silent Spring*, by Rachel Carson,¹⁹⁴ helped to spur national controls on pesticides and, indeed, the environmental movement and other legislation as well. Indeed, Carson’s book, with its vivid narratives of harmful chemicals, may well have played a role in the creation of the Environmental Protection Agency.¹⁹⁵ The point is that Carson did not offer a dry analysis of the costs and benefits of pesticides; her narrative method made particular events highly salient to its readers.

Availability affects public perceptions in general. Within the United States, public concern about risks usually tracks changes in the actual fluctuations in those risks. But public concern outruns actual fluctuations in the important case of “panics,” bred by vivid illustrations that do not reflect changes in levels of danger.¹⁹⁶ At certain points in the 1970s and 1980s, there were extreme leaps in concern about teenage suicides, herpes, illegitimacy, and AIDS—leaps that did not correspond to changes in the size of the problem. Availability, produced by “a particularly vivid case or new finding that receives considerable media attention,” played a major role in those leaps in public concern.¹⁹⁷ In 2006, three incidents of alligator attacks led citizens of Florida to be “suddenly hypervigilant to a danger that seemed to be lurking in every body of fresh water bigger than a bathtub. Calls to hotlines skyrocketed, and all over the state peo-

190. Hamilton, *supra* note 31, at 184.

191. See *id.* at 178–91 (noting fluctuating public concern with toxic waste and media coverage of Toxics Release Inventory Program).

192. Cf. James A. Dunn, Jr., *Automobile Fuel Efficiency Policy: Beyond the CAFE Controversy*, in *Punctuated Equilibrium*, *supra* note 87, at 197, 198–201 (describing subsequent business and government resistance to expansion of CAFE).

193. See Sunstein, *Of Montreal and Kyoto*, *supra* note 17 (manuscript at 11–14) (identifying role of discovery of ozone “hole” in producing Montreal Protocol).

194. Rachel Carson, *Silent Spring* (Houghton Mifflin Co. 1994) (1962). For an overview of the influence of the book, see Thomas Hawkins, *Re-Reading Silent Spring*, 102 *Envtl. Health Persp.* 536 (1994).

195. See Al Gore, *Introduction to Carson*, *supra* note 194, at xv, xx (“The Environmental Protection Agency was established in 1970 in large part because of the concerns and the consciousness that Rachel Carson had raised.”).

196. See Loewenstein & Mather, *supra* note 16, at 171–73.

197. *Id.* at 172.

ple were asking themselves what could possibly be going on.”¹⁹⁸ With terrorism, it is difficult to know whether the response to the 9/11 attacks has been excessive, insufficient, or optimal.¹⁹⁹ But there is no doubt that it was a function of a highly salient event.

Some people operate as *worst-case entrepreneurs*, showing an intuitive understanding of the operation of the availability heuristic. By its very nature, the voice of an influential politician comes with amplifiers. When public officials bring an incident before the public, a seemingly illustrative example is likely to spread far and wide. Because of the magnitude of the harm, the terrorist attacks of September 11, 2001 would inevitably loom large no matter what President Bush chose to emphasize. But the President, and his White House generally, referred to the attacks on countless occasions, frequently as a way of emphasizing the reality of seemingly distant threats and the need to incur significant costs to counteract them (including the 2003 Iraq War). Indeed, President Bush invoked salience on behalf of the Iraq War, offering a vivid picture of the risks of inaction in his 2003 State of the Union Address: “Imagine those 19 hijackers [involved in the 9/11 attacks] with other weapons and other plans—this time armed by Saddam Hussein. It would take just one vial, one canister, one crate slipped into this country to bring a day of horror like none we have ever known.”²⁰⁰

President Bush had a large incentive to invoke the 9/11 attacks. At least in the years immediately following those attacks, a reminder of their occurrence led Americans to show stronger support for him—and the increase in support occurred among those inclined against him as well as those inclined in his favor.²⁰¹ Indeed, even a general reminder of personal mortality, not specifically mentioning the 9/11 attacks, led diverse people to show stronger support for President Bush.²⁰²

With climate change, by contrast, no salient incident triggers public concern. Few people have, or believe that they have, personal experience with climate change. There is no sense of personal alarm. Notwithstanding efforts to link Hurricane Katrina with climate change,²⁰³ the evidence is contested and disputable, and most Americans did not conclude that

198. Michael D. Lemonick, *Death by Alligator*, *Time*, May 29, 2006, at 47, 48.

199. For an argument that it is excessive, see Mueller, *supra* note 6, at 29–32 (arguing that reaction to 9/11 has cost more lives than 9/11 itself).

200. State of the Union Message, H.R. Doc. No. 108-1, at 9 (2003).

201. Gary Blasi & John T. Jost, *System Justification Theory and Research: Implications for Law, Legal Advocacy, and Social Justice*, 94 *Cal. L. Rev.* 1119, 1140 (2006).

202. Mark J. Landau et al., *Deliver Us from Evil: The Effects of Mortality Salience and Reminders of 9/11 on Support for President George W. Bush*, 30 *Personality Soc. Psychol. Bull.* 1136, 1140 (2004).

203. See, e.g., Ross Gelbspan, *Katrina's Real Name*, *Boston Globe*, Aug. 30, 2005, at A17; Joseph B. Verrengia, *Katrina Reignites Global Warming Debate*, *USATODAY.com*, Sept. 1, 2005, at http://www.usatoday.com/tech/science/2005-09-01-katrina-global-warming_x.htm (on file with the *Columbia Law Review*). On the connection between hurricanes and climate change, see Houghton, *supra* note 10, at 2–4, 101–02.

the hurricane was in any sense “caused” by climate change. Consider this question: “Do you think the severity of recent hurricanes is most likely the result of global climate change, or is it just the kind of severe weather events that happen from time to time?” Only 39% responded that the hurricanes were a product of climate change; 54% answered that severe weather events just “happen.”²⁰⁴ If a salient incident does occur, the likelihood of an American response would dramatically increase.

B. *Probability Neglect*

As a result of the availability heuristic, people can offer an *inaccurate* assessment of probability. But sometimes people will attempt little assessment of probability at all,²⁰⁵ especially when strong emotions are involved.²⁰⁶ In such cases, large-scale variations in probabilities will matter little—even when those variations unquestionably should matter a great deal.²⁰⁷ What affects thought and behavior is the outcome, not the likelihood that it will occur.²⁰⁸ The point applies to hope as well as fear; vivid images of good outcomes will crowd out consideration of probability too.²⁰⁹ Lotteries are successful partly for this reason.²¹⁰

The phenomenon of probability neglect received a clear empirical confirmation in a striking study of people’s willingness to pay to avoid electric shocks.²¹¹ The central purpose of the study was to test the relevance of probability in “affect rich” decisions.²¹² One experiment attempted to see whether varying the probability of harm would matter more, or less, in settings that trigger strong emotions than in settings that seem relatively emotion-free.²¹³ In the “strong emotion” setting, participants were asked to imagine that they would participate in an experiment involving some chance of a “short, painful, but not dangerous electric shock.”²¹⁴ In the relatively emotion-free setting, participants were told that the experiment entailed some chance of a \$20 penalty.²¹⁵ Participants were asked to say how much they would be willing to pay to avoid

204. ABC News/Washington Post Poll, *supra* note 155.

205. Oswald Huber et al., *Active Information Search and Complete Information Presentation in Naturalistic Risky Decision Tasks*, 95 *Acta Psychologica* 15, 26–27 (1997) (describing “defusing operators” used by decisionmakers to attempt to exert control over negative event and thus avoid having to assess its probability).

206. Yuval Rottenstreich & Christopher K. Hsee, *Money, Kisses, and Electric Shocks: On the Affective Psychology of Risk*, 12 *Psychol. Sci.* 185, 186–88 (2001) (finding that when emotions are triggered, variations in probability matter relatively little).

207. *Id.* at 188.

208. *Id.*

209. See Charles T. Clotfelder & Phillip J. Cook, *Selling Hope* 75–78 (1989).

210. See *id.*

211. See Rottenstreich & Hsee, *supra* note 206, at 188.

212. *Id.*

213. *Id.*

214. *Id.*

215. *Id.*

participating in the relevant experiment.²¹⁶ Some participants were told that there was a 1% chance of receiving the bad outcome (either the \$20 loss or the electric shock); others were told that the chance was 99%; and still others were told that the chance was 100%.²¹⁷

The central result was that variations in probability affected those facing the relatively emotion-free injury, the \$20 penalty, far more than they affected people facing the more emotionally evocative outcome of an electric shock.²¹⁸ For the cash penalty, the difference between the median payment for a 1% chance and the median payment for a 99% chance was predictably large and indeed consistent with standard models of rationality: \$1 to avoid a 1% chance, and \$18 to avoid a 99% chance.²¹⁹ For the electric shock, by contrast, the difference in probability made little difference to median willingness to pay: \$7 to avoid a 1% chance, and \$10 to avoid a 99% chance!²²⁰ Apparently people will pay a significant amount to avoid a small probability of an affect-laden hazard, and the amount that they will pay will not vary greatly with changes in probability.

A similar conclusion emerges from a study of law student reactions to the risks associated with cancer in drinking water.²²¹ When the bad outcome was described merely as “cancer,” a ten-fold variation in risk (from 1/100,000 to 1/1,000,000) made a greater difference to people’s willingness to pay for risk reduction than when the cancer was described in vivid terms, as “very gruesome and intensely painful, as the cancer eats away at the internal organs of the body.”²²² In short, the matter of probability was neglected when strong emotions were triggered.

There is much evidence in the same vein. When people discuss a low-probability risk, their concern rises even if the discussion consists mostly of apparently trustworthy assurances that the likelihood of harm really is small.²²³ If people are asked how much they will pay for flight insurance for losses resulting from “terrorist acts,” they will pay more than if they are asked how much they will pay for flight insurance from all causes.²²⁴ People also show “alarmist bias.” When presented with com-

216. *Id.*

217. *Id.*

218. *Id.*

219. *Id.*

220. *Id.*

221. See Cass R. Sunstein, *Laws of Fear: Beyond the Precautionary Principle* 77–79 (2005) [hereinafter Sunstein, *Laws of Fear*].

222. *Id.* at 77.

223. See Ali Siddiq Alkhami & Paul Slovic, *A Psychological Study of the Inverse Relationship Between Perceived Risk and Perceived Benefit*, 14 *Risk Analysis* 1085, 1094 (1994).

224. See George F. Loewenstein et al., *Risk as Feelings*, 127 *Psychol. Bull.* 267, 275 (2001).

peting accounts of danger, they tend to move toward the more alarming account.²²⁵

Experiments were designed to test levels of anxiety in anticipation of a painful electric shock of varying intensity, to be administered after a “countdown period” of a stated length. In these studies, the stated intensity of the shock had a significant effect on physiological reactions. But the probability of the shock had no effect. “Evidently, the mere thought of receiving a shock is enough to arouse individuals, but the precise likelihood of being shocked has little impact on level of arousal.”²²⁶

Probability neglect provides a great deal of help in understanding the divergent American reactions to terrorism and climate change. With respect to terrorism, there is an intense, often highly visual reaction to bad outcomes—a reaction that can easily crowd out judgments about probability. The same is hardly true of climate change. To be sure, there is nothing intrinsic to the relevant risk that justifies this state of affairs. As I have noted, some people urged that the devastation of Hurricane Katrina had a great deal to do with climate change, and it is possible to imagine a successful effort to suggest that catastrophic events were caused, or increased in intensity, by virtue of climate change. If so, probability neglect might spur increased regulatory controls on greenhouse gas emissions. At the present time, however, the American public does not connect climate change with particular bad outcomes, and the absence of aggressive regulation is best understood in light of that fact.

C. *An Identifiable Perpetrator: The Goldstein Effect and Outrage*

1. *Goldstein and Nature.* — In George Orwell’s *Nineteen Eighty-Four*, political leaders focused public attention on Emmanuel Goldstein, a former member of the Party who became its despised enemy.²²⁷ In Orwell’s narrative, the Party made Goldstein the outlet and the occasion for public fear and outrage, even when the ultimate source of that fear and that outrage were more plausibly a product of failures of the regime. Osama bin Laden was never a friend to the United States or a member of any of its political parties, and to say the least, he is a genuine enemy. But there can be little doubt that the war on terror has been spurred by what we might call “the Goldstein Effect,” the ability to intensify public concern by giving a definite face to the adversary, specifying a human source of the underlying threat and a person to be blamed for it.²²⁸

225. W. Kip Viscusi, Alarmist Decisions with Divergent Risk Information, 107 *Econ. J.* 1657, 1668 (1997).

226. Loewenstein, *supra* note 224, at 276.

227. George Orwell, *Nineteen Eighty-Four* (Harcourt Brace-Jovanovich 1984) (1949).

228. See Mary Douglas, *Risk and Blame* (1992), for a general account of how particular sources of risk are blamed, and in particular pages 9–14, for an emphasis on practices of blaming that have cultural sources, and that cannot be captured by exploring individual judgments about risk perception.

Of course the risk of terrorism triggers intense outrage, whatever the magnitude of the risk; and when outrage is triggered, the public is likely to respond far more than it otherwise would.²²⁹ If terrorism can be associated with a particular person or group, the response will be increased. This approach has generally succeeded with Osama bin Laden. It was also successful with the attack on Iraq in 2003, as Saddam Hussein became a casualty of the Goldstein Effect. To make these claims, it is of course unnecessary to question the demonization of Osama bin Laden and Saddam Hussein; those who are demonized may actually be demons.

The Goldstein Effect reflects a more general point, which is that people are especially likely to respond to an identifiable perpetrator—just as they are especially likely to respond to an identifiable victim. Joseph Stalin understood the point: “A single death is a tragedy, a million deaths is a statistic.”²³⁰ What is true for victims has close parallels in the context of perpetrators. If a wrongdoer has a clear identity—a face and a narrative—the public is far more likely to support an aggressive response. With respect to risks of all kinds, political actors show an intuitive understanding of this point, mobilizing public reactions by giving a face to the source of the problem. Terrorism is only the most vivid example.

There is no analogue in the context of climate change. Warmer temperatures are a product not of an identifiable perpetrator, but of the interaction between nature and countless decisions by countless actors in the private and public domains. To the extent that nature is partly responsible, or perceived as partly responsible, public concern is greatly dampened.²³¹ Consider the fact that “[h]uman intervention seems to be an amplifier in judgments on food riskiness and contagion,” and indeed such intervention amplifies risk perception more generally, even though “more lives are lost to natural than to man-made disasters in the world.”²³² If nature is put to one side, contributors to climate change include not merely numerous companies in the United States and around the world, but almost all of us, through our daily activities and consumption. There are no obvious devils or demons here—no human beings who actually intend to produce the harms associated with climate change.²³³ In the context of terrorism, a “we-they” narrative fits the facts; in the context of climate change, those who are the solution might well

229. See Peter M. Sandman et al., *Communications to Reduce Risk Underestimation and Overestimation*, 3 *Risk Decision & Pol’y* 93, 106 (1998) (“[S]ubjects in the high-outrage, low-risk situation reported much higher perceived threat . . . than subjects in the low-outrage, low-risk situation, although the actual risk was identical.”).

230. *Bartlett’s Familiar Quotations* 686 (17th ed., Little, Brown & Co. 2002).

231. See Iris Bohnet et al., *Betrayal Aversion on Four Continents* 2 (KSG Working Paper No. RWP06-005, 2006), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=902370 (on file with the *Columbia Law Review*).

232. Paul Rozin, *Technological Stigma: Some Perspectives from the Study of Contagion*, in *Risk, Media and Stigma* 31, 38 (James Flynn et al. eds., 2001).

233. See Abbasi, *supra* note 18, at 122 (“The climate change story is rarely told with a villain; in fact, to the extent that the public correctly perceives that climate change is

also be, or seem to be, the problem. Each of us has our own “carbon footprint.” In these circumstances, public outrage is much harder to fuel, and those concerned with climate change cannot easily take advantage of the Goldstein Effect.

Those who are so concerned might try, and indeed have tried, to use the Goldstein Effect against American leaders, most obviously President Bush, charging him with negligence or even recklessness.²³⁴ And in fact, President Bush’s decision to reject the Kyoto Protocol in 2001 “produced a very strong negative reaction internationally, especially in Europe,” and “the citizens of Europe and their leaders were outraged.”²³⁵ But no one can claim that President Bush has actually *sought* to bring about climate change, and hence it is difficult to produce anything like the level of outrage associated with Osama bin Laden. In the next decades, it might be possible to enlist the Goldstein Effect against India and (especially) China, which are anticipated to be increasingly large contributors to climate change. But nations lack faces.

2. *Outrage as Multiplier.* — More generally, a great deal of evidence suggests the pervasive importance of outrage to people’s reactions to risk. Several studies test this question with the hypothesis that certain low-probability risks, such as those associated with nuclear waste radiation, produce outrage, whereas other low-probability risks, such as those associated with radon exposure, do not. The most striking finding is that even when the risk was statistically *identical* in the nuclear waste (high outrage) and radon (low outrage) cases, people in the nuclear waste case reported a much greater perceived threat and a much higher intention to act to reduce that threat.²³⁶ Indeed, “the effect of outrage was practically as large as the effect of [a] 4000-fold difference in risk between the high-risk and low-risk conditions.”²³⁷ Efforts to communicate the meaning of differences in risk levels, by showing comparisons to normal risk levels, reduced the effect of outrage—but even after those efforts, outrage had nearly the same effect as a 2,000-fold increase in risk.²³⁸ Outrage almost certainly contributed to “right-to-know” legislation involving chemical releases.²³⁹ Terrorism is a high-outrage threat, indeed it may be the high-

connected to energy use, they may recognize their broad complicity, which limits the conflict narrative further.”).

234. See, e.g., Tim Flannery, *The Weather Makers* 241–42 (2005) (generally objecting to failure of Bush Administration to seek controls on greenhouse gases); Editorial, *The State of Energy*, N.Y. Times, Feb. 1, 2006, at A24 (characterizing President Bush’s handling of global warming as “a negligence from which the globe may never recover” and stating that “[w]hile he seems finally to have signed on to the idea that the earth is warming, and that humans are heavily responsible, he has rejected serious proposals to do anything about it and allowed his advisers on the issue to engage in a calculated program of disinformation”).

235. See Brechin, *supra* note 53, at 123.

236. Sandman et al., *supra* note 229, at 106.

237. *Id.*

238. *Id.*

239. See Hamilton, *supra* note 31, at 178–84.

est-outrage threat, and hence the public response is likely to be far more intense than the corresponding response to climate change.

Of course outrage is a social and cultural product, and not a brute fact. It would be possible for officials to heighten or to reduce outrage in either domain. In particular, those concerned about the risks associated with climate change might well be able to increase outrage by identifying the leading contributors to climate change and suggesting that with certain (feasible) steps, they might reduce the relevant risks.

3. *Myopia and Optimism.* — Many people believe that climate change has already imposed significant losses, including a number of deaths across the globe, perhaps as many as 150,000 each year;²⁴⁰ but the most serious risks are long term. Americans appear to understand this point. As we have seen, they believe that the risks will be felt by future generations rather than those now living. It is also clear that this point affects people's willingness to support expensive precautions. The difficulty is that people sometimes "discount" the future at a very high rate, demonstrating a form of myopia that reflects bounded rationality.²⁴¹ At the level of individual behavior, the result can be self-control problems that greatly undermine people's wellbeing.²⁴² Analogous problems emerge in the political domain, as when political officials show a willingness to burden the future by relieving the present.

It is reasonable to think that a similar form of undervaluation affects people's beliefs and behavior with respect to climate change. The problem is likely to be compounded by the presence of optimistic bias, by which people tend to show an unrealistic belief in their own immunity from certain risks.²⁴³ At least when a risk will not be faced until the distant future, and when no available incident heightens concern, optimistic bias can result in little concern about long term risks.

4. *A Note on Culture.* — I have attempted to explain the divergent American reactions to terrorism and climate change by reference to identifiable features of individual cognition. But it might be thought that this explanation misses something important—and that what it misses is a crucial part of diverse reactions to climate change and terrorism. Different groups, with different cultural orientations, focus on different sources of

240. The World Health Organization estimates that climate change produces 150,000 annual deaths and five million disability-adjusted life years. See Jonathan A. Patz et al., *Impact of Regional Climate Change on Human Health*, 438 *Nature* 310, 313 (2005); Juliet Eilperin, *Climate Shift Tied to 150,000 Fatalities*, *Wash. Post*, Nov. 17, 2005, at A20.

241. See Shane Frederick et al., *Time Discounting and Time Preference: A Critical Review*, 40 *J. Econ. Literature* 351, 393–94 (2002); David Laibson, *Golden Eggs and Hyperbolic Discounting*, 112 *Q.J. Econ.* 443, 443–44 (1997); W. Kip Viscusi, *Rational Discounting for Regulatory Analysis*, 74 *U. Chi. L. Rev.* (forthcoming 2007) (manuscript at 22, on file with the *Columbia Law Review*).

242. See the discussion of bounded willpower in Christine Jolls et al., *A Behavioral Approach to Law and Economics*, 50 *Stan. L. Rev.* 1471, 1479 (1998).

243. See Bazerman & Watkins, *supra* note 83, at 74–77; Shelley E. Taylor, *Positive Illusions* 32–36 (1989) (exploring unrealistic optimism in general terms).

danger and on widely diverse risks. Consider a mundane example: “Many Germans believe that drinking water after eating cherries is deadly; they also believe that putting ice in soft drinks is unhealthy. The English, however, rather enjoy a cool drink of water after some cherries, and Americans love icy refreshments.”²⁴⁴ Other forms of cultural variability are more dramatic. In some cultures, judgments about what causes risks, and what reduces risks, would seem extremely puzzling in others.²⁴⁵

In a number of papers, Dan Kahan and his coauthors have explored this question. In particular, they have drawn attention to what they call “cultural cognition”—to risk-related judgments that are a product of cultural orientations, which serve as a kind of heuristic for more fine-grained judgments.²⁴⁶ On this approach,²⁴⁷ people can be sorted into four groups: individualists, hierarchists, egalitarians, and solidarists. Those who fall into the individualist camp tend to distrust government regulation and to believe in free markets; hence they are unlikely to be greatly concerned about climate change. The same is true of hierarchists, who favor the established social order, and who reject efforts to disrupt it; controls on climate change might well be seen as disruptive. By contrast, egalitarians are skeptical of businesses and other institutions that are thought to produce large-scale inequalities in society; egalitarians are sympathetic to environmental causes in general, and they are greatly concerned about climate change. The same is true of solidarists, who believe that human beings owe strong duties to one another—duties that environmental degradation violates.

Kahan and his coauthors claim to show that cultural cognition helps to explain public reactions to numerous risks, including those associated with climate change.²⁴⁸ Egalitarians and solidarists are significantly more concerned about climate change than are hierarchists and individualists. Indeed, Kahan and his coauthors contend that cultural dispositions are a more accurate predictor of such judgments than party identification and demographic characteristics such as race, religion, gender, and wealth.²⁴⁹ In the context of climate change, they find, on the basis of survey evidence, that this is in fact true.²⁵⁰ Certainly it can be demonstrated that political commitments are “clustered”; those who believe that society has

244. See Joseph Henrich et al., Group Report: What Is the Role of Culture in Bounded Rationality?, in *Bounded Rationality: The Adaptive Toolbox* 343, 353–54 (Gerd Gigerenzer & Reinhard Selten eds., 2001), for an entertaining outline in connection with food choice decisions.

245. See Mary Douglas, *Purity and Danger* 1–6 (Routledge 1994) (1966).

246. See Dan M. Kahan & Donald Braman, Cultural Cognition and Public Policy, 24 *Yale L. & Pol’y Rev.* 149 (2006); Kahan et al., *supra* note 111, at 1085–87 (reviewing Sunstein, *Laws of Fear*, *supra* note 221).

247. The foundations of the approach can be found in Mary Douglas & Aaron Wildavsky, *Risk and Culture* 2–15 (1982).

248. See Kahan & Braman, *supra* note 246, at 149–57.

249. See *id.* at 171.

250. See *id.* at 158–59.

“become too soft and feminine,” or that government “interferes too much in our daily lives,” are more likely to resist strong measures to combat climate change. To this extent, there is a link between cultural dispositions and views about climate change. In addition, cultural differences might well be associated with different judgments about particular risk-reduction measures connected with terrorism; before its broader unpopularity, the war in Iraq, for example, split people along lines that are cultural in the sense used by Kahan and his coauthors.

It is possible to go further. It is likely that some groups do consider climate change to be a more serious threat than terrorism, and those groups appear to be identifiable along cultural lines. My own small-scale survey at the University of Chicago Law School found that most respondents did consider climate change the more serious problem, by a margin of 73% to 27%.²⁵¹ An identical study of students at Yale Law School showed similar results, with climate change ranked ahead of terrorism by a margin of 75% to 25%.²⁵² As noted, most Americans do not agree. The University of Chicago and Yale studies did not test for cultural dispositions, but we can say, with some degree of confidence, that as compared with individualists and hierarchists, egalitarians and solidarists are likely to rank the risks of climate change as equivalent to, or higher than, those associated with terrorism.

But there is a problem with use of the idea of cultural cognition to explain American reactions to climate change and terrorism. Why, exactly, are individualists less concerned about climate change than are egalitarians? What connects “culture” to risk perceptions? To make progress, it is necessary to specify the mechanisms by which culture contributes to judgments about risks. A key point involves social influences.²⁵³ If people do not know whether climate change causes serious risks, they are likely to form a judgment on the basis of what they learn from those they know and trust.²⁵⁴ Those who believe that climate change is a seri-

251. In this survey, conducted in April 2006, I asked about twenty-five law students at the University of Chicago to rank four problems in terms of seriousness: climate change, terrorism, motor vehicle safety, and occupational safety and health. My interest was in the relative ranking of climate change and terrorism, and the percentages in the text reflect that interest.

252. This study, identical to the University of Chicago Law School study, see *supra* note 251, involved twenty-seven students.

253. On social influences in general, see Cass R. Sunstein, *Infotopia: How Many Minds Produce Knowledge* 81–102 (2006) (discussing hidden profiles, cascades, and group polarization). For a particularly vivid study, with many implications for the development and operation of culture, see Matthew J. Salganik et al., *Experimental Study of Inequality and Unpredictability in an Artificial Cultural Market*, 311 *Science* 854 (2006) (describing experiment in which some songs became very popular and other songs failed to do so, only because of perception that songs had been downloaded a lot or a little). In my view, the development of social fears has a great deal to do with the mechanisms explored by Salganik et al.

254. On the relevance of this point to environmental policy, see William Brock, *Tipping Points, Abrupt Opinion Changes, and Punctuated Policy Change*, in *Punctuated*

ous problem might so believe because they are following the views of trusted others.²⁵⁵ If people sort themselves into different groups, showing different fears, then risk perceptions will be influenced by the different memberships of the different groups, and such perceptions will diverge accordingly.²⁵⁶ Note that the resulting differences may or may not operate along geographical lines. If environmentalists are influenced by other environmentalists, then their fears about climate change might have little to do with physical location.

This understanding of cultural cognition emphasizes the role of social influences on individual beliefs and actions. Such influences come in two forms: informational and reputational.²⁵⁷ Suppose that trusted people believe that climate change is a serious problem; if so, there is reason to believe that climate change imposes significant risks, because that belief supplies valuable information. And if trusted or at least powerful people so believe, there is reason to go along with them, in large part because they may well be right, but also to avoid incurring their wrath; there is a reputational reason to follow them. When people are divided along certain lines, and when certain beliefs tend to “cluster,” it is typically because of informational and reputational pressures. To the extent that beliefs about climate change are a product of cultural cognition, social influences are a large part of the explanation. Indeed, bounded rationality and social influences operate together, as social interactions increase availability, produce or attenuate probability neglect, aggravate outrage, and spur myopia and optimistic bias. The behavioral factors emphasized here hardly operate in a social vacuum.

We might also want to explore attitudes toward terrorism and climate change as they operate across different nations. Perhaps something in American culture helps to account for the divergent reactions that I am investigating. But even if this is so, culture should not be treated as a black box. The domestic judgment will inevitably be affected by a perception of domestic consequences and in particular of domestic costs and benefits.²⁵⁸ The United States took a strong stand against ozone-depleting chemicals, and hence was probably the most aggressive nation in the world in attempting to combat a global environmental problem often

Equilibrium, *supra* note 87, at 48 (discussing social learning and its effects on rapid changes in environmental policy).

255. This describes what is known as cascade effects. See generally David Hirshleifer, *The Blind Leading the Blind*, in *The New Economics of Human Behavior* 188 (Mariano Tommasi & Kathryn Ierulli eds., 1995) (exploring dynamics of informational cascades). On the implications for risk regulation, see Brock, *supra* note 254, at 50 (exploring cascade effects and their effects on rapid changes in environmental policy).

256. See Salganik et al., *supra* note 253, at 854 (showing divergences as result of such sorting in domain of cultural products).

257. See Sunstein, *Laws of Fear*, *supra* note 221, at 94–102 (investigating informational and reputational cascades in domain of risk regulation).

258. Benedick, *Morals and Myths*, *supra* note 151, at 15–16 (exploring how national self-interest helps account for targets in Kyoto Protocol).

coupled with climate change.²⁵⁹ And while many nations have ratified the Kyoto Protocol, and appear by their statements to be far more concerned about climate change than the United States, actual practice shows a more complex story—with several such nations showing emissions increases, in the last period, equivalent to or greater than those of the United States.²⁶⁰

In any case, cross-national variations are affected, in large part, by behavioral factors of the sort that I have emphasized. More specifically, salient events can greatly increase fear in one nation but not others, and divergences in salience help to explain cross-national variations. In particular, the availability heuristic helps to explain such variations, though what is available is affected by, and is a contributor to, cultural differences.²⁶¹

D. *Boundedly Rational Risk Perception*

The behavioral account is now in place. Those who emphasize the availability heuristic, probability neglect, outrage, myopia, and optimism do not contend that risk perception and risk-related behavior are “irrational”; instead they stress the role of mental shortcuts and emotions in heightening or dampening people’s judgments about risk. Those who suffer from bounded rationality do care about both costs and benefits, but their assessment of these is affected by heuristics and biases, in a way that can lead to severe and systematic errors. If the argument thus far is correct, bounded rationality provides the best and most complete account of the divergent American reactions to terrorism and climate change.

1. *A Problem.* — An obvious objection might be raised against this argument: It is exceedingly difficult to contend that anyone is making “errors” here. We might be tempted to think that because of availability bias, the risk of terrorist attacks is inflated;²⁶² we might similarly think that because of unavailability bias, the risks associated with climate change are underestimated. But there is no universally accepted benchmark from which to make these judgments. With respect to terrorism, the questions of probability are too uncertain to justify a confident conclusion that Americans are excessively fearful;²⁶³ a “best estimate” of 300 terrorism-related deaths in, say, the next year may turn out to be too high or too low, but no clear evidence justifies a confident judgment, in the present year, that this estimate is optimistic or pessimistic. In retrospect,

259. See Sunstein, *Of Montreal and Kyoto*, supra note 17 (manuscript at 13–15) (detailing aggressive role of United States in pushing for Montreal Protocol).

260. See *id.* at 33.

261. For discussion, see Kahan et al., supra note 111, at 1085 (arguing that different cultural groups have different “availability” to incidents).

262. See Mueller, supra note 6, at 13–28 (arguing that risk of catastrophic terrorist attack remains extremely small).

263. But see *id.* at 13–28 (arguing that fears are excessive).

some of the terrorism-related probability judgments of Americans in 2003 did seem inflated,²⁶⁴ but this is not an area in which availability is clearly leading to excessive fear. With climate change, it is also difficult to say that all or most Americans are underestimating the current risks. Perhaps the nation is doing too little to respond to those risks, but existing evidence does not justify a confident conclusion that the existing perception of risk is too low.²⁶⁵

What can be said, then, is not that there are any clear errors, but that the behavioral factors—availability, probability neglect, and outrage, in particular—help to explain the divergent American reactions to terrorism and climate change, and a purely rational account is, to that extent, incomplete. Of course it is possible to insist that the United States has operated sensibly on the basis of available information; that the events of 9/11 supplied valuable information; and that the risks of climate change are, on the basis of available information, insufficient to justify highly aggressive controls. But this account is too insensitive to what is generally known about risk perception, and it disregards the fact that the behavioral factors would predict exactly the divergence that we observe. As I have emphasized, boundedly rational people are attentive to the costs and benefits of risk regulation. The problem is that their assessments of the relevant factors are often distorted by behavioral influences.

2. *Prescription.* — It is for this reason that in the United States, national leaders are under little pressure to attempt to reduce the risks associated with climate change.²⁶⁶ Of course such leaders have considerable room to maneuver. So long as Americans are not greatly affected in economic or other terms, real steps to reduce greenhouse gases would be publicly acceptable. But if leaders believe that the argument for such steps is weak, we would not expect them to be forthcoming. Let us suppose that the American government should, in principle, be doing much more to control greenhouse gas emissions.²⁶⁷ How might it be encouraged to do so?

264. See Feigenson et al., *supra* note 122, at 996 (showing personal belief on part of American respondents that they faced 8.27% chance of dying due to terrorism in next year).

265. For evidence of sensible risk perceptions, see W. Kip Viscusi & Richard Zeckhauser, *The Perception and Valuation of the Risks of Climate Change: A Rational and Behavioral Blend 9* (KSG Working Paper No. RWP05-062, 2005), available at <http://papers.ssrn.com/abstract=832645> (on file with the *Columbia Law Review*) (showing that among highly educated Americans, risk perceptions with respect to climate change show high degree of accuracy, in terms of their consistency with expert projections).

266. The California experience is a counterexample, and it is possible that the United States will eventually take steps along the lines of those in California. For discussion, see Sunstein, *Of Montreal and Kyoto*, *supra* note 17 (manuscript at 6–7).

267. Many people do, in fact, take this position. See, e.g., Abbasi, *supra* note 18, at 141–53 (listing five recommendations for politicians); Posner, *supra* note 5, at 155–65 (arguing for taxes on greenhouse gases); Richard B. Stewart & Jonathan B. Wiener, *Reconstructing Climate Policy 68–75* (2003) (arguing for international agreement that includes much emissions trading and participation by developing nations); Sheila M.

a. *Costs.* — The easiest way would be to attempt to replicate the success of efforts to combat depletion of the ozone layer—by showing that the costs of reduction efforts would be far lower than feared. The magnitude of those costs is of course an empirical question. But the replacement of ozone-depleting chemicals turned out to be far less expensive than originally anticipated, and the unexpectedly low costs helped to spur American enthusiasm for international restrictions.²⁶⁸ In sharp contrast to climate change, the American public was willing to support steps to protect the ozone layer, while the European public was indifferent or even opposed to such steps, in part because of a perception that their costs would be significant.²⁶⁹

On the cost side, a great deal depends on technological innovations. Technology-forcing has proved successful in many domains. If the anticipated costs of reducing greenhouse gas emissions remain very high, aggressive action is less likely. But if it is possible to reduce such emissions without imposing significant economic burdens, perhaps by forcing technological innovation with respect to greenhouse gases,²⁷⁰ the American posture would surely shift, perhaps dramatically.

b. *Benefits.* — A second way to affect American attitudes would operate on the benefit side. If the United States actually had, or believed that it had, a great deal to lose from climate change, and in the immediate future rather than the long run, more costly regulation would be anticipated.²⁷¹ Here we might replicate the experience not only of the Montreal Protocol but also of the acid deposition program of the Clean Air Act, which was spurred in part by new evidence of the risks associated with acid deposition.²⁷² No salient incident lay behind the acid deposition program. A clearer appreciation of the risks of climate change would undoubtedly affect American attitudes.²⁷³ New projections of harm, suggesting that the United States has a great deal to lose, would undoubtedly have an impact.²⁷⁴ But for purposes of understanding pub-

Olmstead & Robert N. Stavins, *An International Policy Architecture for the Post-Kyoto Era*, 96 *Am. Econ. Rev.* 35, 35–36 (2006) (calling for broad coverage of treaty and economic incentives); Robert N. Stavins, *Can an Effective Global Climate Treaty Be Based on Sound Science, Rational Economics, and Pragmatic Politics?* 10–11 (2005) (unpublished manuscript, on file with the *Columbia Law Review*) (arguing for treaty that is based on appreciation of costs and benefits). A valuable discussion can be found in Scott Barrett, *Kyoto and Beyond: Alternative Approaches to Global Warming*, 96 *Am. Econ. Rev.* 22 (2006).

268. See the account in Percival et al., *supra* note 42, at 1049–51.

269. *Id.* at 1050.

270. On some of the possibilities, see Stern, *supra* note 7, at 221–26.

271. See Lane, *supra* note 87, at 183–84.

272. See Ellerman et al., *supra* note 140, at 22–30 (showing role of economic thinking in producing acid deposition regulation).

273. This is the basic message of Abbasi, *supra* note 18, at 24–32.

274. See Stern, *supra* note 7, at 128, 130 (offering qualitative account of risks and also quantitative account of both optimistic and pessimistic scenarios); Frank Ackerman & Ian Finlayson, *The Economics of Inaction on Climate Change: A Sensitivity Analysis* 16–18

lic perceptions, it is important to underline the potential role of vivid images of harm. Such images, introduced by a salient incident or by concrete narratives, can have large effects on legislative initiatives;²⁷⁵ and if there is anything like a kind of 9/11 for climate change, aggressive measures might well be anticipated.

I have emphasized the role of leaders in the private and public sectors; public beliefs and desires are endogenous to their claims, and hence the salience of 9/11, and the continuing sense of fear, had a great deal to do with the statements and actions of President Bush.²⁷⁶ In 2004, the White House released a fact sheet on the war on terror, starting with a quotation from President Bush: “[W]e’re still not safe. . . . We are a Nation in danger.”²⁷⁷ By contrast, Prime Minister Tony Blair argued that there is “no bigger long-term question facing the global community” than the threat of climate change.²⁷⁸ Because of the fact of 9/11, and because serious efforts to control climate change would inevitably impose real costs on the United States, any American official will have limited ability to shift the public’s current levels of concern. But there is no question that fear of terrorist attacks can be heightened or diminished²⁷⁹—and that it would be possible to increase the salience and hence the level of concern about the risks associated with climate change, and hence to magnify the public demand for a regulatory response.

c. *Costs and Benefits: A Final Comparison.* — I have offered a number of comparisons between the problem of ozone depletion and that of climate change, and it may be useful to conclude by offering a more systematic overview. In 1988, the Environmental Protection Agency offered the following account of the costs and benefits of the Montreal Protocol:

(Global Dev. and Env'tl. Inst., Working Paper No. 06-07, Oct. 2006), available at <http://www.ase.tufts.edu/gdae/Pubs/wp/06-07EconomicsInaction.pdf> (on file with the *Columbia Law Review*) (suggesting that costs of inaction are higher than previous estimates indicate).

275. See Hamilton, *supra* note 31, at 178–84 (emphasizing role of Bhopal disaster in spurring Toxic Release Inventory); Kahn, *supra* note 81, at 23–24 (finding increased congressional response after environmental disasters).

276. See Goodin, *supra* note 5, at 164–70.

277. *Id.* at 166 (quoting Press Release, Office of the Press Sec’y, Three Years of Progress in the War on Terror: Fact Sheet (Sept. 11, 2004), at <http://www.whitehouse.gov/news/releases/2004/09/20040911.html> (on file with the *Columbia Law Review*)).

278. Norton & Leaman, *supra* note 54, at 2 (quoting Climate Issue ‘Critical’ to Blair, BBC News, Apr. 27, 2004, at <http://news.bbc.co.uk/2/hi/uk/3662303.stm> (on file with the *Columbia Law Review*)).

279. See Goodin, *supra* note 5, at 160–72.

TABLE 2: COSTS AND BENEFITS OF MONTREAL PROTOCOL TO THE UNITED STATES (IN BILLIONS OF 1985 DOLLARS)²⁸⁰

	No controls	Montreal Protocol	Unilateral implementation of Montreal Protocol by the United States
Benefits	-	3,575	1,373
Costs	-	21	21
Net benefits	-	3,554	1,352

It should be clear that for the United States, unilateral action was amply justified, because the health benefits of American action would create substantial benefits to the American public. And if the world joined the Montreal Protocol, the benefits would be nearly tripled, because it would prevent 245 million cancers, including more than five million cancer deaths.²⁸¹ One of the most noteworthy features of the ozone depletion problem is that over time, the United States was anticipated to be a decreasingly large contributor to that problem. By 2050, no controls were expected to mean a 15.7% decrease in the ozone layer, whereas unilateral American action would produce a 10.3% decrease, and the international agreement would result in a mere 1.9% decrease.²⁸² By 2100, no controls were expected to mean a 50% decrease; unilateral action a 49% decrease; and the international agreement a 1.2% decrease.²⁸³ In the short run, aggressive action by the United States alone was amply justified by the cost-benefit calculus. In the long run, the United States would do much better with global cooperation. At the same time, the expected cost of the Montreal Protocol, a mere \$21 billion, greatly dampened public resistance, and the cost turned out to be even lower than anticipated because of technological innovation.²⁸⁴

Compare in this regard an influential account of the relevant figures for the Kyoto Protocol:

280. See Barrett, *supra* note 28, at 228 tbl.8.1.

281. *Id.* at 228.

282. *Id.* at 228 tbl.8.1.

283. *Id.*

284. *Id.* at 231.

TABLE 3: COSTS AND BENEFITS OF KYOTO PROTOCOL IN THE UNITED STATES (IN BILLIONS OF 1990 DOLLARS)²⁸⁵

	No controls	Kyoto Protocol	Unilateral Action to Comply with Kyoto Protocol
Benefits	-	12	Approximately 0 ²⁸⁶
Costs	-	325	325
Net benefits	-	-313	-325

What is noteworthy here is that on this admittedly controversial projection, the costs of the Kyoto Protocol were much higher than the costs of the Montreal Protocol (by some \$313 billion), and the benefits of the former were much lower than the benefits of the latter (by some \$3,562 billion!). For the Kyoto Protocol, the cost-benefit ratio seems, on this account, to be so unpromising that from the standpoint of American self-interest, a great deal would have to be done to justify American support, at least from that standpoint. Note that the cost-benefit ratio, for the Kyoto Protocol, ought not to be taken to suggest that the monetized costs of climate change are trivial. On the contrary, they are estimated in the trillions of dollars—\$4 trillion in present value, according to one estimate.²⁸⁷ The problem is that the Kyoto Protocol, by itself, would do relatively little to reduce those costs; on one projection, the controls in the protocol would reduce total warming by merely 0.03° C by 2100.²⁸⁸

Nor do I mean to endorse any particular set of numbers, or to deny the possibility that the Kyoto Protocol, or a similar agreement, might be defended either on the ground that it could serve as the foundation for a better one, or as a means of producing technological innovation. The point is not to deny that climate change might impose serious burdens, risks, and costs for the United States as for other nations; it is only that for the United States to find regulatory controls worthwhile, a method must be found to drive down the costs (actual and perceived) and to increase the benefits (actual and perceived).

285. See Nordhaus & Boyer, *supra* note 5, at 156–67.

286. This is my estimate. It is a product of the fact that the Kyoto Protocol, by itself, is anticipated to make a modest contribution to the reduction of warming—according to Nordhaus & Boyer, *supra* note 5, at 152, a reduction of 0.03° C. If the United States acted only on its own, it would inevitably produce a small fraction of that benefit, and the consequent benefits for the United States are likely, as a first approximation, to be zero. I am assuming that unilateral action does not spur action by other nations.

287. See Barrett, *supra* note 28, at 379. A much more systematic effort, with a far higher figure, can be found in Stern, *supra* note 7, at vi–xi (suggesting in particular anticipated 5–20% loss in global GDP from 2–5° C warming, with 10% loss in poor nations). For a criticism, see Stern, *supra* note 7, at 6–17 (suggesting that figures in Stern Review are inflated because of use of unjustifiably low discount rate).

288. Nordhaus & Boyer, *supra* note 5, at 152. According to current trends, warming of 2–3° C is anticipated within the next fifty years, see Stern, *supra* note 7, at vi, and in the longer term, there is a greater than 50% chance of warming in excess of 5° C, see *id.* at iv.

A broader agreement, including China and India in particular, would significantly increase the benefits of greenhouse gas reduction, simply because it would include increasingly important contributors to the problem, as developing countries are projected to account for over half of total global emissions by 2020 and possibly before.²⁸⁹ Hence a broader agreement would greatly magnify the benefits to both the United States and the world.²⁹⁰ It should also be possible to design an agreement that dramatically reduces the costs for America and elsewhere—as, for example, with global emissions trading and with emissions reduction requirements that grow over time as technology advances.²⁹¹

The point is not, however, to suggest an ideal treaty to handle the problem of climate change.²⁹² It is only to suggest that American perceptions and behavior are likely to change only if the assessment of costs and benefits changes as well. A purely technocratic analysis and good policy design, of the sort that culminated in the Montreal Protocol, may be sufficient to accomplish that task. But it is reasonable to suspect that in light of the complexity of the climate change problem, and the inevitably high cost of addressing it, vivid incidents, real or imagined, will have to play a role.

CONCLUSION

My principal goal here has been to make some progress in understanding the divergent American reactions to the risks associated with terrorism and climate change, and in that way to help explain the existing patterns of law and regulation. American reactions are greatly affected by the availability heuristic, probability neglect, and outrage. Those reactions have been dampened for climate change, because Americans have believed that they have relatively little to lose from greenhouse gas emissions and that expensive regulation would mostly help people in other nations in the distant future. Partly for that reason, they have been unwilling to spend a great deal to respond to the problem. The images associated with terrorism are concrete and easy to envision; the images associated with climate change are highly abstract.

Of course interest group pressures and the statements of public officials matter, and such pressures and statements can help both to shape public perceptions and to affect the likelihood of any regulatory response. I have emphasized the role of leaders in the private and public

289. See Olmstead & Stavins, *supra* note 267, at 35–36.

290. See Barrett, *supra* note 28, at 379; Nordhaus & Boyer, *supra* note 5, at 123–44.

291. William Nordhaus, *The Stern Review on the Economics of Climate Change* 2–3 (Nov. 17, 2006) (unpublished manuscript, on file with the *Columbia Law Review*), available at <http://nordhaus.econ.yale.edu/SternReviewD2.pdf> (suggesting that economic analysis supports “modest rates of emissions reductions in the near term, followed by sharp reductions in the medium and long term”).

292. Stern, *supra* note 7, at vi–ix (describing importance of treaty regulation in this area and suggesting that significant controls would produce benefits far in excess of costs).

sectors. Public beliefs and desires are influenced by their claims, and hence the salience of 9/11, and the continuing sense of fear, had a great deal to do with the statements and actions of President Bush.²⁹³ Recall President Bush's words in 2004: "We are a Nation in danger."²⁹⁴ Recall too that Prime Minister Tony Blair argued that there is "no bigger long-term question facing the global community" than the threat of climate change.²⁹⁵ Statements of this kind undoubtedly have contributed to the greater public concern with climate change in the United Kingdom than in the United States.

Because of the attacks of 9/11, and because serious efforts to control climate change would almost certainly impose real costs on the United States, any American official will not have unlimited ability to shift the public's levels of concern. But there is no question that fear of terrorist attacks can be heightened or diminished—and that it would be possible to increase the salience and hence the level of concern about the risks associated with climate change, and in that way to magnify the public demand for a regulatory response.

If the public's analysis of likely costs and benefits shifted, perhaps as a result of more vivid incidents of tangible harm,²⁹⁶ domestic controls on greenhouse gases, and American participation in international agreements, would be far more probable. For the risks associated with climate change, it is not simple to promote availability; but vivid images are possible to provide here as well. There are multiple equilibria: Single incidents and small shocks can make an extraordinary difference in terms of law and regulation.²⁹⁷ With respect to terrorism, the attack of 9/11 was not exactly a small shock, but a single incident, on a single day, radically altered the associated risk perceptions of Americans, and greatly affected law as well.

293. See Goodin, *supra* note 5, at 164–70.

294. *Id.* at 166 (quoting Press Release, Office of the Press Sec'y, Three Years of Progress in the War on Terror: Fact Sheet (Sept. 11, 2004), at <http://www.whitehouse.gov/news/releases/2004/09/20040911.html> (on file with the *Columbia Law Review*)).

295. Norton & Leaman, *supra* note 54, at 2 (quoting Climate Change Critical to Blair, BBC News, Apr. 27, 2004, at <http://news.bbc.co.uk/1/hi/uk/3662303.stm> (on file with the *Columbia Law Review*)).

296. Michael Crichton's controversial bestseller, *State of Fear* (2004), shows a strong understanding of cognitive and behavioral factors. (To avoid giving away the punchline, I offer no details.) The same is true of Al Gore's popular film, *An Inconvenient Truth* (Paramount Classics & Participant Prod. 2006). (The punchline there is clear.)

297. See Thomas A. Birkland, *After Disaster: Agenda Setting, Public Policy, and Focusing Events* 131–44 (1997) (exploring role of disasters in focusing public and legislative attention); Thomas A. Birkland, *Lessons of Disaster: Policy Change After Catastrophic Events* 57–58 (2006) (emphasizing that disasters can greatly affect legislative agenda); Hamilton, *supra* note 31, at 178–84 (showing role of Bhopal disaster in producing American legislation); Brock, *supra* note 254, at 48–49, 76; Kahn, *supra* note 81, at 23–24 (finding increased legislative activity after environmental disasters); Repetto, *supra* note 87, at 9.

To be sure, what is available to some may not be available to all, in part because of social influences, and in part because of individual, cultural, and national predispositions. It follows that some nations will find the bad outcomes associated with one or another risk to be “available” not only because of highly publicized events, but also because the relevant citizens are predisposed to focus on some risks rather than others. But even across national differences, public assessments can be altered by available incidents; if vivid incidents become salient, aggressive regulation is far more likely to be forthcoming.

