

Technocracy, Democracy, and U.S. Climate Politics: The Need for Demarcations

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Ulrich Beck and other theorists of reflexive modernization are allies in the general project to reduce technocracy and elitism by rendering decision making more democratic and robust. However, this study of U.S. climate politics reveals complexities and obstacles to the sort of democratized decision making envisioned by such theorists. Since the early 1990s, the U.S. public has been subjected to numerous media-driven campaigns to shape understandings of this widely perceived threat. Political interests have instigated an important part of these campaigns, frequently resorting to ethically problematic tactics to undermine attempts at policy action designed to avert or reduce the threat. The disproportionate influence of such interests suggests the need for a more level political playing field characterized by more equalized access to power and influence.

Keywords: *climate change; controversy; democracy; expertise; technocracy; U.S. conservative movement; reflexive modernization*

Again and again, like a mantra, we heard calls for “sound science” from Members [of U.S. Congress] who had little or no experience of what science does and how it progresses.

—Brown (1996, ii)

AUTHOR'S NOTE: This article has benefited from insightful commentaries from numerous friends and colleagues. I especially want to thank Michael M. J. Fischer, Dale Jamieson, Sheila Jasanoff, Roger Pielke Jr., and two anonymous reviewers for the care and time they put into reading and commenting on this manuscript at various stages of its development. Their comments

Science, Technology, & Human Values, Vol. 30 No. 1, Winter 2005 137-169
DOI: 10.1177/0162243904270710
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An uncritical and theoretically uninformed discourse of expertise has fostered both an instrumental attitude toward experts on the part of government and relatively weak demands for accountability from citizens. . . . Expertise has legitimacy only when it is exercised in ways that make clear its contingent, negotiated character and leave the door open to critical discussion.

—Jasanoff (2003)

At the height of the Newt Gingrich–led “Republican Revolution” in 1995, a long-time Democratic staffer on the U.S. Science Committee whom I interviewed expressed distress at the dynamics of science advice in Congress. Commenting on the increased role of “think tanks” and what he considered illegitimate scientific experts in climate-related hearings, he said,

Washington has had think tanks that do battle with policy issues for a long time. That is a staple of Washington life. What is different about think tanks such as the Marshall Institute [an influential Washington D.C.–based think tank] is the veneer of scientific credibility. Congress can’t tell the difference between real science and junk science; they [i.e., the purported experts] all wear white lab coats.

Audiences versed in science and technology studies are well aware that the above staffer’s demarcation between “real science” and “junk science” elides the complexity and subjectivity such judgments involve. Universal and ahistorical (“essential”) criteria by which to define science from nonscience and “pseudoscience” have proven elusive, revelatory of individual, institutional, and political prerogatives rather than universally accepted rational principles; there is no transcendental criteria by which to make such judgment (Fleck [1935] 1979; Gieryn 1995; Jasanoff and Wynne 1998; Jasanoff 1987; Kuhn [1962] 1970; Mulkay 1976). Distinctions between science and pseudoscience fit uneasily in academic fields where notions such as “truth,” “accuracy,” “adequacy,” and “objectivity” are thus justifiably treated as historical and political accomplishments rather than reflections of exogenous reality (see, among many others, Daston and Galison 1992; Jasanoff 1987; MacKenzie 1990; Shapin and Schaffer 1985, 14; van der Sluijs et al. 1998).

Nevertheless, U.S. climate politics highlight the need for discrimination between better and worse sources of scientific information, most centrally on

have greatly strengthened the final product—testimony to the importance of peer review for the production of more robust, albeit neither value-neutral nor infallible, knowledge. I am grateful to the following U.S. institutions for funding the research that made this article possible: National Center for Atmospheric Research; National Science Foundation Program on Societal Dimensions of Engineering, Science, and Technology; and the Environmental Protection Agency’s STAR Fellowship program.

the basis of peer review. Following others (Brown and Mikkelsen 1990; Fortun 2001; Fischer 2003; Sabel, Fung, and Karkkainen 2000), this study demonstrates that exposure to countervailing opinions does not necessarily result in a more informed, participatory, and critically aware citizenry, a necessary basis for legitimate policy making in policy arenas in which only probabilistic knowledge is possible. This study of U.S. climate politics highlights problematic aspects of how governments, international bodies, and political and vested interest groups have chosen to deploy science. It shows that these actors deploy science and the “symbols of science” (Toumey 1996) in ways that constrain public debate and critical, balanced understanding of the strengths and limitations of scientific knowledge.

Theories of reflexive modernization, such as that of Ulrich Beck (1992a, 1992b), are allies in the project to democratize science- and technology-dependent societies increasingly faced with unpredictable and potentially catastrophic ecological risk scenarios. Theorists of reflexive modernization call for new institutional arrangements by which to render societies more resilient through incorporation of greater heterogeneity of information and interpretive frameworks. They rightly stress the need to look beyond science and include alongside the latter other types of knowledge if societies are to reduce their vulnerability to risk-blind technocratic frameworks of understanding and management. In the face of unpredictable new environmental threats, scientific ways of knowing need to be supplemented by other types of knowledge and expertise because many ecological problems today involve irreducible uncertainties that escape expert awareness, definition, and control.

The present study calls attention to complexities and obstacles to reflexive modernization theorists’ important project to render decision making more robust and resistant to the perverse effects of technocratic rule. This study demonstrates that the project to liberate politics is not likely to succeed in the United States unless more decision makers and members of the general public learn to be critical judges of scientific knowledge (e.g., by relying on indicators such as peer review) and unless ways are found to remedy the present reality of unequal access to financial resources and the media. These are starting-point challenges for redesigning civil society institutions for a techno-scientific, media-saturated, and money-greased world.

Democratizing Science

Ulrich Beck (1992a) anticipates that in “risk society,” “the soft—orientations, hopes, ideas, and people’s interests”—will triumph over “the hard—

the organizations, the established, the powerful, and the armed” (p. 117). The key to this “democratic triumph” is awareness of new kinds of scientific and ecological uncertainties that make evident the limits of knowledge at any given moment as well as the unavoidable reality of risk. “The exposure of scientific uncertainty is the liberation of politics, law, and the public sphere from the patronization by technocracy” (p. 109). Beck suggests that complementary and often conflicting knowledges about ecological reality—whether from the shop floor, academic laboratories, or bureaucratic policy reports—trigger this liberation; they reduce the power of technocrats by raising awareness of experts’ limited ability to produce authoritative truths and to steer public affairs independently of political deliberation. In a context of scientific, political, and practical polyphony, environmental risks will be perceived as the high-stake (albeit uncertain) threats that they are. The polyphony will undermine the dangerous and false security of a “society from the drawing board”—whether this is technocracy or public relations campaigns on the part of those who “find themselves in the public pillory as risk producers” (p. 119).

Consistent with Beck, Silvio Funtowicz and Jerome Ravetz (1992) argue for the reversal of centralized control over the production of knowledge related to threats such as global climate change. They reduce distinctions between scientific experts and nonexperts, stressing that in the face of uncertain new environmental threats, assessment of scientific materials should be undertaken by experts and lay persons alike:

The quality assessment of the scientific materials in such circumstances cannot be left to the experts themselves; in the face of such uncertainties, they too are amateurs. Hence there must be an *extended peer community*, and they will use *extended facts*, which include even anecdotal evidence and statistics gathered by a community (P. 254).

Similarly, Beck (1992a) asserts that “in matters of hazards, no one is an expert—particularly not the experts” (p. 106). He stresses that inherent uncertainties associated with knowledge of new environmental risks involve a heterogeneity of actors in making (competing) claims about scientific truth. As a result, science becomes “reflexive” and extends to itself the skepticism that is its own inherent foundation in its approach to the world (Beck 1992b, 155).¹ In the process, and although science continues to be a primary source of cognitive authority, it also loses some of its authority as its claims to truth and enlightenment are demystified.

Beck and Funtowicz and Ravetz thus envisage a democratization of science in the sense of bringing relevant parts of science into public debate along with all the other issues affecting a given society. Funtowicz and Ravetz (1992) insist on retaining the label of “science” for knowledge produced by such means, arguing that it represents a new evolution in the continual transformation of science through history, a transformation driven by changing social needs. A necessary step toward this new paradigm is an acknowledgment of the limited role science can play in conflict resolution. This allows policy issues to be addressed directly, reducing “unrealistic public expectations of scientists” and thus strengthening “both science and democracy” (p. 228).

In a sense, American politics anticipated Beck’s argument twenty years ago. Participatory, inclusive processes related to the identification and definition of environmental risks emerged in the 1960s and 1970s in response to the technocratic structures that dominated U.S. political decision making at that time. Public voices insisted on opening up technical decision making to alternative experts and to nonscientific members of the public, resulting in the creation of new political structures that increased public participation in governmental decision making. The 1946 Administrative Procedure Act imposed standardized openness requirements for all federal regulation, and later laws, such as the 1970s Federal Advisory Committee Act and extensive environmental and consumer protection legislation, built on that substrate, mandating notification and participation. Outside of the government, civil society organized to reduce barriers to entry into public debate, resulting in Superfund legislation-mandated citizen action panels (Fischer 2003) and the proliferation of think tanks and activist organizations that developed expertise and strategies to influence public policy (see, among others, Diamond 1995; Fischer 1990; Helvarg 1994).

In short, more people were allowed to have voice and claim expertise in the decision-making processes, and more organizations began to enlist experts in their effort to shape political decision making. Yet the following analysis of U.S. climate politics and a series of associated public relations campaigns suggests that participatory structures and the loosening of technocratic control over information in the United States have not bolstered “the people” in the broad-based sense anticipated by Beck. One important reason for this is that political and financial elites enjoy disproportionate power to influence public opinion and political decision making.

The Dichotomized Scientific Voices on Climate Change in the United States

The push by Beck and Funtowicz and Ravetz to decentralize control over the production of knowledge related to global environmental change is arguably less suited for the American policy context than for that of Europe; care should be taken in applying these European analysts' framework to U.S. climate politics because there are important differences between the European and American policy environments (Jasanoff [1990] 1994). The U.S. does not share the European technocratic and closed approach to decision making related to environmental and technological risks, the approach that informs the above theoretical frameworks. In the United States, expert deliberation on scientific evidence is not as shielded from public debate, and control of the production and mobilization of knowledge is relatively looser, allowing greater proliferation of competing risk constructions in government and broader society ([1990] 1994).

Even in the U.S. context, the liberating potential of exposure to a plurality of scientific pronouncements on the issue is limited, however. It is limited in part by a tendency common among actors on both sides of the issue to present their preferred "facts" and associated policy agendas as true and obvious, beyond the need for deliberation. This suggests that exposure to a heterogeneity of conflicting scientific pronouncements does not liberate society from the patronization by technocracy nearly as automatically as one might understand Beck to be suggesting, nor is it clear that it necessarily enhances awareness of irreducible uncertainty.

The following introduction to some of the competing scientific voices on the climate issue in the United States illustrates the heterogeneity of voices seeking to define climate reality in the United States. The various voices can be grouped into two main contending positions. Both positions are staged as if they were engaged in a rhetorically balanced debate in which one side attempts to collect data and construct prudential, risk-reducing policies while the other side attempts to undermine any action on the grounds that it would be unreasonable and overly expensive to do anything when the scientific models are at best only probabilistic products integrating inconclusive data and significant indeterminacies.

The Intergovernmental Panel on Climate Change and the Scientific Mainstream

The United Nations Intergovernmental Panel on Climate Change (IPCC) has concluded that "the balance of evidence suggests a discernible human

influence on global climate” (Houghton et al. 1995) and predicts a global average temperature rise of 1.5°C to 4.5°C from a doubling of carbon dioxide. It foresees even greater temperature rises if the atmospheric concentrations of greenhouse gases continue past that arbitrary benchmark, which may be reached within a century (Intergovernmental Panel on Climate Change [IPCC] 1990, 2001; Houghton et al. 1995). The IPCC, formed under the auspices of the World Meteorological Organization and the United Nations Environmental Program, centrally informs the United Nations Framework Convention on Climate Change, the international negotiations to reduce global emissions of greenhouse gases. The IPCC is constituted by hundreds of scientists from around the world. When including the number of reviewers, its reports involve several thousand environmental scientists from academia, industry, and nongovernmental organizations with widely ranging views on the climate issue. The production of IPCC statements and reports involves extensive peer review and allows consideration only of scientific evidence that has been peer-reviewed and published. The IPCC process is thus designed to maximize accountability and transparency, and strict guidelines reduce the play of politics, although they do not eliminate them.²

The ability of the IPCC and other groups to impress U.S. politicians and the public with their warnings has been circumscribed by powerful segments of U.S. society, however. Although reputable national polls have found widespread concern about global warming and support for policy action (Program on International Political Attitudes 1998),³ the issue has given rise to repeated controversies revealing deep contention on the issue among scientists and nonscientists alike. The “scientific mainstream,” as represented by the IPCC and other widely respected scientific institutions, has repeatedly been challenged by a coalition of actors advancing competing interpretations of the science underpinning environmental concern and opposing policy action on behalf of climate change. This coalition has had significant effect on U.S. climate politics, both inside and outside of the government (Brown 1995; Gelbspan 1997; Ehrlich and Ehrlich 1996; McCright and Dunlap 2003).

Conservative financial elites and fossil fuel–related vested interests have been central driving forces in this “environmental backlash,” which has relied on a group of about ten of scientists as providers of essential scientific authority.⁴ The high-profile climate dissidents are largely a U.S. phenomenon: while Germany, Sweden, and England, in addition to a few other countries, host one or two such skeptics each, no other countries dispose of a similarly large “resistance movement” or the scientific cacophony they help create.

Although some seek to discredit all dissidents on the climate issue as “pseudoscientists,”⁵ the high-profile scientific greenhouse critics all have Ph.D.s, and their ranks include at least a few scientists whose credentials and expertise on the climate issue is recognized by their opponents (Ehrlich and Ehrlich 1996, 36-37). Most prominent among them is Richard Lindzen, an atmospheric scientist holding prestigious positions as professor at the Massachusetts Institute of Technology and member of the National Academy of Science. Lindzen stated in 1993 that “the data neither suggest nor support current warming scenarios. . . . Under the circumstances, the possibility of large warming, while not disproven, is also without a meaningful scientific basis” (Lindzen 1993). The title of the article, which appeared in the popular *National Geographic* magazine, read, “Absence of Scientific Basis,” thus denying the scientific legitimacy of arguments supporting concern about human-induced climate change (Lindzen 1993). Nearly ten years later, the opinion of this scientist remains largely unchanged.⁶

The “antigreenhouse” coalition has created a series of high-profile controversies attacking the credibility of the IPCC and its consensus. This loose coalition contests the computer-based predictions of large climate disturbances resulting from humans’ emissions of greenhouse gases, along with recent statistical studies said to suggest that humans already are responsible for observed changes in global temperatures. A dominant interpretation advanced by members of this coalition is that even if humans are changing the global climate (which they tend to refute), these changes are economically and ecologically beneficial. They see a greener, agriculturally more fertile world as a “wonderful and unexpected gift from the industrial revolution” (Robinson and Robinson 1997). Members in this network typically find internationally binding climate policy unnecessary, unreasonable, overly expensive, and destructive of U.S. economic competitiveness in the world economy (see, among many examples, Michaels 1992; Robinson and Robinson 1997; Seitz 1996; Science and Environmental Policy Project 1992).⁷

The present analysis problematizes especially the use of dissident scientists in media campaigns generated by financial and political elites. This should not be understood to imply that the contrarian scientists are necessarily wrong or unworthy sources of scientific understanding nor that the general consensus in favor of the theory of dangerous human interference with the global climate is necessarily right; scientific truth is not decided on the basis of consensus. My critique is focused on the money-dominated machinery that seizes on the dozen dissident scientists, a machinery that (1) owes its success to the unequal distribution of financial resources and political influence, (2) often resorts to techniques that deceive rather than illuminate the citizenry, and (3) gives disproportionate influence to a minority of scientists

and to non-peer-reviewed opinions on the part of the latter. The ways in which the dissident scientists are used by such vested interests illustrate the value of scientific authority as a political resource and the extent to which such scientific authority can be simulated. Such abuses of scientific authority (described further below), in turn, underscore the need for a general public equipped to identify them and to distinguish between better and worse sources of scientific information (i.e., the relatively greater reliability of the IPCC over a coalition of industry groups with vested interests in a fossil fuel dependence). Since the abuses are designed to be concealed, they are not easily identified. Publics also need to develop critical distance to the objectivist discourses commonly deployed by scientists and other actors on both sides of the issue.

An Obstacle to Recognition of Uncertainty: Objectivism

The discourses with which actors in U.S. climate politics present their interpretations of climate reality form one of the obstacles to recognition of uncertainty and the limits of scientific ways of knowing, keys to democratic triumph over technocracy in Beck's framework. Despite the heterogeneity of apparently authoritative voices in the United States on the issue of climate change, lay persons are not necessarily impressed by scientific uncertainty and the limits of science. This is partly because these discourses tend to reinforce already common tendencies in American culture to overestimate the powers of science (Toumey 1996). Dominant understandings and representations of science encourage unrealistic expectations of science as able to transcend social forces and provide a vantage point from which to identify a singular objective reality (Toumey 1996). Scientists have professional interest in preserving high social regard and expectations in relation to science, including common associations of science with objectivity and value neutrality. One way in which this interest manifests itself is in the attacks suffered by scientists who break standards by being willing to disclose and discuss the ways in which values and interests inform their own engagement as scientists.

Representations of Science: Certain Presentations of Uncertainty

IPCC leaders' efforts to legitimize the IPCC and its reports may at times downplay the interpretive flexibility of science, the social and political

negotiation the assessment process involves, and the subtle ways in which choice of language in the reports can reflect underpinning environmentalist concern (Lahsen 1998). Environmental activists defending concern about human-induced climate change are particularly prone to downplay uncertainties that might mitigate or undermine environmental concern and policy action. For instance, scientists working with environmental activist groups typically invoke scientific evidence and the authority of the IPCC only when it reinforces the case that human's actions are leading to catastrophe. As an atmospheric scientist noted in a review of a text produced by scientists affiliated with Greenpeace, the Greenpeace scientists mention dissenting arguments "*only* when they are *more* worrying than the IPCC report, *never* when they are *less so*" (Kandel 1991, 421-22). Such renditions do not aid public understanding of the heterogeneous nature of science, in general, and of the full range of uncertainties surrounding the theory of human-induced climate change in particular.

Despite the attacks to which they are often subjected, scientists who have chosen to speak against the prevailing dogma serve an important and socially beneficial purpose to the extent that they counter biases in the mainstream; it is highly valuable for robust decision making to have scientists who are disposed to question widely perceived truths and to call attention to interpretive biases shaping dominant conceptions of environmental problems and related science. Diversity of social and scientific perspectives can enhance societal resilience by identifying and facilitating preparedness for a range of possible scenarios, as pointed out by Beck and others (see Thompson and Rayner 1998).

However, the high-profile dissident scientists on the climate issue are often themselves even more guilty of rhetoric transformation of scientific uncertainties into certainties, with sweeping statements to the effect that there is "not a shred of persuasive evidence" that humans have been responsible for increasing global temperatures and that "carbon dioxide emissions have actually been a boon for the environment" (Robinson and Robinson 1997). Media-savvy contrarians such as the Robinsons, along with some high-profile proponents on the issue of climate change, seek to strengthen the effect of their views by reducing the hedging caveats generally characteristic of scientific discourses (for discussion and more examples of this, see Balling 1992; Michaels 1992; Rampton and Stauber 2001; Schneider 1993, among others).

Actors on both sides thus avoid acknowledgment of the role of perspective and values in making such judgments and in their selection of evidence, drawing on science instead to defend and legitimize political decision making.⁸ In the process, they perpetuate the common but mistaken idea that

science can speak for itself and dictate policy independent of political judgment (Jasanoff and Wynne 1998; Nelkin 1979; Pielke 1997). Thus, for instance, the title of an article by two “chemists” published on the op-ed pages of the *Wall Street Journal* read, “Science Has Spoken” (Robinson and Robinson 1997). Similarly, University of Virginia atmospheric scientist Patrick Michaels presents President George W. Bush’s rejection of the Kyoto Protocol as “science-based,” in contrast to the “scientific poverty” of the Kyoto Protocol” (U.S. Newswire 2002).

The few climate scientists who dare to break with this convention by disclosing value dimensions informing their understandings and policy preferences related to climate change stand to lose influence, status, and credibility. For instance, IPCC leader John Houghton found his scientific authority attacked because of acknowledgement in his popular book on global warming that Christian values inform his environmental views (Houghton 1994). Richard Lindzen suggested in a public forum that Houghton was “motivated by something other than simply the science of purported warming,” namely, a “religious need to oppose materialism” (Lindzen 1995).⁹ Lindzen thus sought to discredit Houghton as biased, implicitly positing himself as unbiased. Ironically, Lindzen had also been the object of similar attacks resulting from his statement to a journalist from *Science* that his scientific skepticism was based in part on “theological” beliefs (Kerr 1989). Illustrative of the chastising effects of such attacks, Houghton omitted his self-disclosure in the second edition of the book (Houghton 1997). Explaining in the foreword that although he believes science should be “presented in the broad context of human values,” Houghton said he preferred to be “somewhat more objective and less personal” in this edition. For unexplained reasons, he claimed to find this “more appropriate” for “student readers from a wide range of disciplines, for whom the edition is particularly suited.”

*Interpretations of Science:
The Role of Political Values and
Beliefs in the Selection of Facts*

Despite objectivist portrayals of scientific reality of the sort described above, persons may be impressed by uncertainty. People may, as Beck suggests (Beck 1992a, 109), choose to play competing expert statements against each other without privileging any of them. However, this is not a necessary result from exposure to competing pronouncements. Indeed, the interpretive flexibility of science facilitates a diversity of interpretations that tend to reflect and reinforce diverse perceived interests and beliefs. The same National Academy of Science review that environmentalists thought settled

the science on global warming in favor of concern and policy action was seen by other actors as confirming conclusions to the opposite. An article in the *New York Post* (2001) celebrated President George W. Bush's continued rejection of "the-sky-is-falling Chicken Littles" in his comments about the Academy review. The article rejected the widespread suggestion that the report "settles everything on global warming and creates the need for the United States to adopt the Kyoto Protocol" to the "typically poor reporting by the national media."

Consumers of climate science seldom receive conflicting factual statements with a uniform attitude of skepticism. Rather, they tend to select and uphold as "true" those scientific opinions that support their preferred values, interests, and beliefs, reflective of how sociocultural and political understandings generally mediate perceptions of scientific reality and environmental risks (Douglas and Wildavsky 1984) and of the tenaciousness of interpretive frameworks in the face of countervailing evidence (Kahneman, Slovic, and Tversky 1982).¹⁰ Cultural and political meanings guide interpretations toward perceived certainties that reflect and support individual policy preferences. Thus, persons guided by common understandings of science described above are at least as likely to pick their preferred "facts" as they are to be impressed by uncertainty in the face of conflicting expert opinions. The same is also suggested by the considerable correlation between political ideology and environmental beliefs in the United States (Klineberg 1997; Dunlap, Xiao, and McCright 2001). In short, while institutions of reflexive modernization may provide exposure to multiple sources of information, some sources of information tend to be privileged at the reception end.

A Continued Role for Expertise

Like Beck, Funtowicz and Ravetz seek to strengthen democracy by disputing the distinction between experts and nonexperts in areas of "post-normal" science,—that is, in the face of environmental threats such as human-induced climate change that involve great scientific uncertainty and high stakes. As these theorists also recognize, however, expertise remains "essential" in today's world (see, e.g., Funtowicz and Ravetz [n.d.]). Expertise and democracy are not inherently adversarial concepts, as long as experts are appointed by governments to speak in the public interest and are endowed with only carefully circumscribed powers (Jasanoff 2003).¹¹ The problem of technocracy is better solved by reforming the way expertise is mobilized and used rather than by not resorting to technical expertise at all, which would

foreclose a key resource and open institutions to charges of incompetence. Science (e.g., in the form of scientific advisory committees) can “inject a *much needed* competence and *critical intelligence* into a regulatory system that otherwise seems all too vulnerable to the demands of politics” (Jasanoff [1990] 1994, 1; emphasis added).

Based on the same general premise, Steven Turner (2001) argues for a more nuanced understanding of expertise than that advanced by critical theorists’ oftentimes rather monolithic equation of knowledge with power and ideology. Turner identifies different types of experts and argues that some types are more threatening to liberal democracy than are others. When knowledge has been certified by disciplinary peers (e.g., in physics), this does provide a reasonable basis for acceptance of their claims. Peer review is a demonstrably fallible process (Jasanoff [1990] 1994; Lakatos 1970; Wennerås and Wold 1997), but it is nevertheless one way to identify science that is more reliable and that involves relatively more critical thinking and intellectual rigor and, therefore, less distortion of the facts. Most dangerous to democracy, argues Turner (2001), is a particular type of expert that emerged at the end of the nineteenth century in the United States. This type of expert emerged when private foundations began to create and subsidize recognized “experts” with the power to influence public opinion and, hence, public demand and public policy (pp. 133-36). Turner identifies this kind of expert as particularly common in American politics but notes that it increasingly marks international politics as well. The threat posed by this type of expert is a function of concealed motivations and undisclosed funding by vested interests (p. 135). The sections that follow illustrate the important role in U.S. climate politics of such concealment and encouragement of mistaken assumptions.¹² As such, the following sections also underscore the need to discriminate between sources of scientific information. Guiding questions, however fallible, ought to be the following: Is knowledge claim *x* based on peer-reviewed science? Is knowledge claim *x* accompanied by respectful recognition of countervailing evidence? Who is disseminating knowledge claim *x*? Knowledge claims ought to be treated with particular suspicion when they (1) do not cite peer-reviewed scientific publications, (2) are particularly strident and only mention and respect harmonizing evidence, and (3) are disseminated by nonscientific groups and actors with obvious political and financial interests in acceptance of the claim. However, campaigns in the United States designed to counter concern about climate change also reveal how difficult it can be, in practice, to apply these criteria, not the least because many such campaigns are designed to create false impressions.

Campaigns to Counter Concern about Climate Change

Defining Science in Public Relations Campaigns: The Role of Nonscientists and Simulated Scientific Authority

Since the growth of concern about global warming in the late 1980s, industry groups have created a host of campaigns to counter concern about human-induced climate change. “Can PR Cool the Greenhouse?” asks a 1991 piece in *Science* on an ad campaign by the Information Council for the Environment (ICE); it was funded by a group of electric utilities, coal companies, and manufacturers. “If a slick ad campaign can cool Americans’ enthusiasm for controls on greenhouse warming, stand by for a big chill.” The campaign effort started at a time of proposed legislation that would impose energy taxes and regulations on these industries to lower emissions of greenhouse gases. “Some scientists say the earth’s temperature is rising. They say that catastrophic global warming will take place in the years ahead,” reads the big print of one of the ads. “Yet, average temperature records show Minneapolis has actually gotten colder over the past fifty years. . . . Facts like these simply don’t jibe with the theory that catastrophic global warming is taking place.” Different versions of the same argument appeared in ads focused on other states. The factual basis of the ads was debatable, at best. As the *Science* article explains, the temperature in these states has “little or no bearing at all” on the global warming question; even if Minneapolis had cooled—which it had not, according to the *Science* article—this would not have undermined the global warming theory. According to the IPCC and, hence, to dominant scientific understanding, an average global warming does not preclude cooling in certain localized areas (*Science* 1991, 1784).

Internal ICE documents¹³ outlined the strategies for the campaign, which included the following: “Reposition global warming as theory (not fact),” “target print and radio media for maximum effectiveness,” “achieve broad participation across the entire electric utility,” and “use a spokesman from the scientific community.” ICE enlisted Robert Balling, Sherwood Idso, and Patrick Michaels, described by the *Science* article as “three of a half-dozen or so outspoken greenhouse dissidents among United States scientists” (*Science* 1991, 1784).

The ICE documents also described the organization’s strategy of targeting less-educated segments of the population, which ICE test marketing had identified as most receptive to its message. The company placed some of its

ads during the shows of media pundit Rush Limbaugh. Limbaugh's TV and radio shows enjoy weekly audiences of about twenty million people and spread Limbaugh's ICE-resonating claims that there is "little scientific evidence" behind the theories of global warming and ozone depletion. Limbaugh boldly but wrongly claimed that his views are "validated by virtually every new study being done, with the exception of those using solely computer models" (Limbaugh 1994, 197).

Another dominant player on the industry side is Western Fuel Association, a \$400 million consortium of coal suppliers and coal-fired utilities. As a result of financial losses that it blamed on "the climate change debate" and flooding in the Midwest that disrupted coal deliveries (Western Fuels Association 1993, 5), the company mobilized to contest the scientific premise of global warming. In its 1993 annual report, Western Fuels acknowledged having sought out scientists espousing a skeptical point of view about climate change—the same group of scientists sought out by ICE.

Western Fuels decided to finance such things as the newsletter *World Climate Review*, which is edited and mostly written by Patrick Michaels. The non-peer-reviewed newsletter meshes discussions of science and environmental policy with strong criticisms of mainstream scientific and political environmental establishments and advocacy for a neoliberal political agenda, as evidenced in article titles such as "Free Science, Free Markets."¹⁴

Western Fuels also sponsored a \$250,000 video tape titled *Greening of Planet Earth*. As suggested by its title, the video promoted the allegedly beneficial consequences of increased atmospheric levels of carbon dioxide to undermine environmental policy to reduce greenhouse gas emissions. Within months of its release, the video had been broadcast 362 times in 61 media markets. A well-orchestrated advertisement campaign boosted worldwide circulation of the video to 15,000 copies within the first year alone (Western Fuels Association 1993, 14). The video "made the rounds in policy circles" (p. 14) and is said to have influenced the administration of then-president George H. W. Bush (Gelbspan 1995, 34).

The 1998 Petition Campaign is another campaign involving deceptive public relations tactics to gain undeserved scientific authority—what Christopher Toumey (1996) calls "conjuring" of science. The tactics deployed represent a challenge to the democratic subversion posited by Beck, a subversion Beck predicates on an accurate understanding of scientific uncertainty and of the inherent limitations of science in dictating policy decision making. The tactics also suggest the need for distinctions between better and worse sources of information regarding science.

The Example of the 1998 Petition Campaign

In 1998, tens of thousands of U.S. scientists received an envelope containing a bulk-mailed letter, an article, and a petition form. The letter was signed by Frederick Seitz, former president of the National Academy of Sciences and chairman of a think tank, the George C. Marshall Institute. Seitz's letter asked recipients to join a campaign urging the U.S. government to reject international efforts to reduce greenhouse gas emissions through the Kyoto Protocol. The petition said that "substantial scientific evidence" shows increased greenhouse gas emissions to have beneficial ecological consequences, whereas there is "no convincing scientific evidence" supporting concern about human-induced climate change.

The petition could be accessed and signed via an Internet site and collected more than 15,000 signatures from both scientists and nonscientists. On the petition form, signatories had the option of indicating their scientific background, as some did. The actual list of signatories includes persons identified as scientists and nonscientists with advanced degrees. Many signatories did not lay claim to advanced degrees. Assuming that all the signatories reported their credentials accurately, credentialed climate experts on the list are very few. Nevertheless, many, including elected politicians, interpreted the signatories as credentialed experts on the climate issue, including Chuck Hagel (R-Nebraska). In a House hearing, Hagel told of the "extraordinary response" to the petition effort, asserting that "nearly all of these 15,000 scientists had technical training suitable for evaluating climate research data" (*Washington Post* 1998).

The list even included fictional persons. Careful study of the list revealed the names of fictional characters from the "Star Wars" movies as well as the name of pop singer Geri Halliwell from the "Spice Girls" band. Critics of the petition had added bogus names to illustrate the lack of accountability the petition involved, including the difficulty—the practical impossibility—of verifying even the actual existence of each of the signatories, not to mention their expertise. To make the latter point, someone had added the title of "Dr." to Halliwell's name (*Washington Post* 1998).

Additional examples of "conjured" scientific authority emerged around the petition campaign. The letter asking people to sign the petition was accompanied by a copy of the *Wall Street Journal* editorial article by Arthur and Zachary Robinson, the two "chemists" quoted above. "Science Has Spoken," read the title (Robinson and Robinson, 1997). The prestigious sounding institution with which they were affiliated—the Oregon Institute of Science and Medicine—was elsewhere revealed to be a one-room operation located on a farm on a rural road in the forested foothills of the Siskiyou

Mountains. It consisted only of Arthur B. Robinson, a chemist with a Ph.D. in chemistry from the California Institute of Technology, and his 21-year-old son, who has no advanced degree (Hill 1998).

Accompanying the petition package was an article referred to as a “scientific summary.” It was authored by Arthur and Zachary Robinson, as well as two Ph.D. astrophysicists, Sallie L. Baliunas and Willie Soon. The former two were once again affiliated with their “Oregon Institute,” while Baliunas and Soon were listed as affiliated with the George C. Marshall Institute. The summary reviewed scientific evidence concerning climate change, concluding that “predictions of harmful climatic effects due to future increases in minor greenhouse gases like CO₂ are in error and do not conform to current experimental knowledge.”

The “scientific summary” was another instance of deceptive manipulation of recognized symbols of science: it was formatted such that it looked like an article that had appeared in the *Proceedings of the National Academy of Sciences*, a renowned and peer-reviewed scientific journal issued by the prestigious U.S. National Academy of Sciences. Yet the summary was not peer-reviewed and, according to recognized climate experts, contained numerous inaccuracies and one-sided presentation of the scientific evidence—what one climate expert referred to as the “cherry-picking of facts.”¹⁵ According to the National Academy, many lay persons and scientists were indeed misled, as indicated by the many calls it received from persons wanting to know whether the Academy had indeed taken a stance against the global warming theory (*Science* 1998).

Arthur Robinson initially declined to reveal the funding sources of the petition campaign. In response to pressure, he eventually acknowledged industry groups as the main financial backers of the campaign (Hill 1998).

Simulation of grassroots support and similar deception is not particular to climate politics. It represents a deliberate tactic on the part of some public relations firms, as evidenced in the headline of a 1996 article in the *New York Times* titled “Sometimes Lobbyists Strive to Keep the Public in the Dark” (Fritsch 1996). The article describes a speech given by Neal M. Cohen, a specialist in “grassroots” lobbying from the public relations firm Apco Associates. In his talk to lobbyists, which was taped without his knowledge, Mr. Cohen “underscored a serious theme: the importance of keeping the public in the dark about who the clients really are.” Grassroots lobbying is a technique that camouflages an “unpopular or unsympathetic” client, often a large business. Typically, the client hires a Washington public relations firm to organize a coalition of small businesses, nonprofit groups, and individuals across the nation. The coalition draws public sympathy for the legislation sought by the original client, who recedes into the background. Through advertise-

ments, the public relations firm recruits members who serve as a grassroots cover for the client initiating and funding the effort—as Cohen is quoted as saying, they “used every campaign tactic [they] had in order to bring in as many people” as possible, making sure that “typical people [were] mixed in with large employers and political contributors.”

The George C. Marshall Institute, which was central in the 1998 Petition Campaign, presents itself as an objective source of policy advice on matters related to science, the environment, and national defense. On its Web site, as elsewhere, the institute claims to counter the politicization and misuse of science by providing policy makers with “accurate,” “rigorous,” and “objective” analyses on a range of public policy issues concerning science, national defense technology, the environment, and the economy. It offers itself as an alternative to a general trend toward politicized scientific appraisals.¹⁶

The claims to objectivity of think tanks such as the George C. Marshall Institute emerge as another obstacle for lay recognition of bias in scientific information. The Marshall Institute was established in the 1980s to influence opinion and policy. It was established and continues to be run by means of money from wealthy conservative elites, including the Mellon Scaife’s family foundation (McCright 1998; Sarah Scaife Foundation 1996). Between 1992 and 1994 alone, the Marshall Institute, which is part of the conservative antienvironmental movement (McCright and Dunlap 2000), received more than a million dollars from just twelve influential private foundations supporting the conservative movement (McCright 1998, 62). Despite the institute’s self-description, it is not unbiased. It shows a consistent bias toward free-market forces unfettered by regulation, which it also promotes. It was the Marshall Institute that was the target of the staffer’s complaint in the introduction about think tanks with deceptive pretenses to scientific objectivity.

Effects and Implications of the Campaigns

The process of wrestling with the broader issue of science and democracy forces recognition of the deep contradiction that characterizes the present moment: at the same time that discourses in many forums—in academia as well as in international development agencies—promote civil society and democracy, economic inequality continues to grow continuously greater both at national and international levels.¹⁷ At present, the latter has profound implications for who gets to engage in demarcations regarding science. Ideally, those celebrating and calling for public participation would also explicitly recognize this reality and, whenever possible, help identify ways of countering the trend.

Aside from the deceptive strategies they often involve, public relations campaigns of the sort described above are problematic because they partake of a wider undemocratic phenomenon endowing those with more money and better access to the media disproportionate political influence (Newman 1999). While the broad-based environmental movement is powerful and rich by some standards, it is disadvantaged in these respects compared to industry and financial elites who have mobilized on the opponent side. According to the investigations of a former *Boston Globe* journalist, a single company—the American Petroleum Institute (API)—spent “only slightly less than the combined yearly expenditures on global warming of the five major environmental groups that focus on climate issues” (Gelbspan 1995, 34). For 1993 alone, API paid \$1.8 million to the public relations firm Burson Marsteller, partly to defeat a proposed tax on fossil fuels. The environmental movement’s relative disadvantage is also reflected in disparities in lobbying power; the environmental lobby is of limited influence compared to other lobbies on the Hill, where it is “seriously outgunned by battalions of corporate lobbyists,” in the words of one policy analyst (Bosso 1997, 65).

The undemocratic dimension of this disparity is that while the environmental movement grew out of broad-based grassroots mobilization, the antienvironmental movement has largely been mobilized and paid for by conservative financial elites, joined by industry groups with vested interests in fossil fuels (Diamond 1995, 1996). Some industries and private foundations provide financial support to the environmental movement. However, the antienvironmental nongovernmental organizations dispose of financial resources that far outweigh those of their environment counterparts; almost all of the influential think tanks formed since the early 1970s have been conservative or libertarian (Soley 1991, 418-19), funded either directly by corporations or by private foundations controlled by a “small group of wealthy capitalists and corporate elites” (Allen 1992, 92). The network of conservative foundations and the level of mobilized financial resources they enjoy are unparalleled in the liberal camp (Ricci 1993; Stefancic and Delgado 1996, 140-47).¹⁸

Conservative and financial elites have had profound influence in U.S. society generally (Allen 1992; Diamond 1995; Ricci 1993; Salisbury 1997; Saloma 1984; Soley 1991) and on environmental politics in particular (Brown 1996; Helvarg 1994; Lahsen 1998; McCright 1998; McCright and Dunlap 2000). Republican elected officials have been particularly receptive to conservative think tanks and special interest groups’ campaigns against mainstream environmental science and climate policy (Brown 1996; Dunlap, Xiao, and McCright 2001; McCright and Dunlap 2000). Such demarcations of science fit congressional Republicans’ recent efforts to fundamentally

change environmental regulation processes. These efforts express themselves in raised standards of proof through new and stricter risk assessments (presented as “sound science”) and cost-benefit analyses.¹⁹

The public relations campaigns helped the above political efforts by delegitimizing the IPCC in favor of alternative experts. Thus, House Majority leader Tom Delay (a Republican representative from Texas) dismissed the IPCC assessment without having read it: “I haven’t seen this [IPCC] study, so I can’t comment on this particular study,” Delay said during a Congressional hearing, “But it’s been my experience that . . . the conclusion is usually written before the study is even done” (U.S. House of Representatives 1995, 28).

It is one thing to consider the opinions of alternative experts; such experts can counter policy systems’ tendency to “fall hostage” to “imperfect” interpretations and methods and the associated failure to question and reopen for review underlying assumptions (Jasanoff 1998). However, the policy process is weakened when influential policy makers sanction exclusive reliance on minority opinions that are undisciplined by peer review, at the expense of the majority scientific opinion and rigorously peer-reviewed science.

A report released on Earth Day 2002 further underscored the extent to which influential U.S. policy makers rely on the opinions of individual contrarians. The “New Report on Global Warming and Kyoto Protocol” concluded that the Kyoto Protocol is “environmentally irrelevant.” It was ordered by the American Legislative Exchange Council (ALEC), which appointed Patrick Michaels to produce it. Among the leadership of America’s state legislatures, ALEC members are said to “hold an impressive presence” (U.S. Newswire 2002). ALEC includes thirty-two Speakers and Speakers pro tem, twenty-two Senate presidents and Senate presidents pro tem, twenty-two Senate majority and minority members, and thirty House majority and minority leaders. ALEC alumni include nine sitting governors, three lieutenant governors, two senior cabinet-level positions, and more than eighty members of Congress (U.S. Newswire 2002).

The policy process is also weakened to the extent that it is significantly influenced by misleading accusations of the IPCC promoted by financial elites and vested interests. Delay’s rejection of the IPCC as biased reflects this influence. Contrary to Delay’s suggestion, the IPCC does not carry out research and formal rules prevent it from assessing studies that have been published and peer-reviewed, not to mention not yet carried out. The inaccuracies in Delay’s portrayal illustrate the effect of public relations-led campaigns of the sort described above, campaigns designed to discredit the IPCC in favor of fossil fuel interests and a deregulatory political agenda.

Discourses emanating from conservative think tanks and from some members of Congress (Brown 1996, 12) celebrate the high-profile skeptical

scientists as innovators daring to speak truth to tyranny of political correctness exerted by the IPCC and the mainstream scientific establishment. These discourses present the IPCC, and the scientific establishment as a whole, as merely a politically motivated interest group. Thus, for instance, a 1996 campaign orchestrated partly by the Global Climate Coalition, a consortium of fossil fuel interests, charged IPCC authors with “major deception” in the form of unauthorized editing of a particularly crucial chapter supporting the 1995 IPCC report’s overall conclusions. Although close analysis of the revisions revealed some very subtle changes in favor of greater scientific certainty and environmental concern (Lahsen 1998), it did not support the charges of deception or wrongdoing (see also Edwards and Schneider 2001).²⁰ Despite its flaws, these analyses identified a level of transparency, discipline, and accountability on the part of the IPCC that was unmatched by its accusers, who made their effect by means of sensationalist and mostly unfounded claims circulated via the media. For instance, after-the-fact independent review of the claims revealed as false the charge that the revisions reduced scientific uncertainties to mere “hints” when two out of the chapter’s six sections were dedicated to discussion of uncertainties (Lahsen 1998). Circumventing disciplining review, the charges gained wide effect through the media.²¹

Like Delay, Republican representative Doolittle relied for his assessment of ozone depletion on a single scientific critic of the IPCC consensus reports, S. Fred Singer. When asked in a 1995 congressional hearing to specify the peer-reviewed science supporting his conclusion that there was no scientific basis for ozone depletion, Doolittle responded, “I consulted Dr. Singer, who is a very authoritative source, and I will stand with the Doctor” (U.S. House of Representatives 1995, 19).

By contrast to the IPCC, Singer’s views on climate change and ozone depletion are rarely if ever peer reviewed.²² Singer has a Ph.D. in physics and some expertise in atmospheric science. Singer left scientific research and academia years ago to establish a political advocacy organization, however, and his writings manifest a strong, consistent bias in favor of a strongly neoliberal and politically conservative agenda.²³

The abolition in 1995 of the Office of Technology Assessment (OTA) further opened Congress to the play of one-sided representations of policy options. A symbolic part of budget politics during the height of the Republican Revolution, the abolition was justified on budgetary grounds “precisely because its budget was so small” (Bimber 1996, x). The OTA was designed to illuminate links between technical claims and political interests (Bimber 1996). It minimized politicization of its policy advice by maximizing the range of possible policy options associated with any given scientific and

technological results, leaving it up to policy makers to select among the range of options. Whereas political advocacy guides interpretation toward a preferred policy option, policy analysis at its best increases the range of alternatives available for consideration (Pielke 2002). By abolishing the OTA, Congress eliminated an important instrument in policy formation and further opened Congress to the play and influence of one-sided political advocacy.

According to polls, perceptions on the part of the threat of climate change of a majority of the U.S. public may harmonize with the scientific consensus view; there are limits even to strong financial interests' power to shape prevailing understandings of environmental reality. However, such interests continue to influence political agendas in the United States. A case in point were recent efforts of the George W. Bush White House to control or eliminate discussion of climate change in a 2003 review by the U.S. Environmental Protection Agency (EPA) of what is known about various environmental problems. An article in the *New York Times* (Revkin and Seelye 2003) described how the White House officials edited out of the EPA report reference to IPCC and U.S. National Research Council conclusions related to humans' negative effect on the global climate. The White House also sought to edit out discussion of a study showing that global temperatures have risen sharply in the previous decade compared with the last 1,000 years. Administration officials replaced the latter with a new study questioning that conclusion, a study partly financed by the American Petroleum Institute. EPA staff members contested the White House editing. Their compromise with administration officials was to delete the entire discussion to avoid criticism that they were "selectively filtering science to suit policy" (Revkin and Seelye 2003). As a result, the report included only a few noncommittal paragraphs on the risks from rising global temperatures, emphasizing the complexities and uncertainties of the issue and calling for more research rather than policy action (Revkin and Seelye 2003; *New York Times* 2003).

“The People” Versus Technocracy and the Powerful: Questioning Categories and Assumptions

Beck rightly stresses the principles of participation and reflexivity as general guidelines in the project to democratize decision making related to uncertain environmental threats. However, he does not outline more concretely how to counter power inequities of the sort that structure U.S. climate politics and give disproportionate voice and influence to elites. Moreover, Beck's rhetoric at times succumbs to simplicities and dichotomies that can

obscure rather than bring into focus the starting point challenges to the democratic transformation he envisions.

At times, Beck resorts to simple dichotomies that are challenged by a more complicated reality. For instance, when Beck (1992a) posits that “orientations, hopes, ideas, and people’s interests” will triumph over “the organizations, the established, the powerful, and the armed,” he lumps together technocracy and the powerful on one side, pitching them against an idealized but undefined “people’s interest.” Yet power is more dispersed than this seems to suggest (Foucault 1980), and technocracy and “the powerful” are not always one and the same. For instance, although an entity such as the IPCC may be powerful, its power is countered by powerful industrial and political groups identified above. If the IPCC is captured by the term “technocracy”—as Wynne (1994) suggests that it is—it is clear that technocracy and some of “the powerful” are not on the same side. Critiques (Lash 1994; Wynne 1996) have identified Beck’s rationalist assumptions and his relative inattention to complexities and interactions within civil society. These critiques, in turn, have tended to focus on grass roots and lay persons without bringing into central focus the disproportionate influence of socioeconomic elites within civil society and government.

Beck’s rhetoric begs other questions as well: Who exactly are “the people”—who is included and who is not? Who gets to define the “people’s interest” and by what process? To what extent do Beck’s “people” manage to identify their own self-interests and values independent from the pervasive influence of the media that control it? Beck’s faith in the people resonates with tendencies in critical theory more generally to idealize civil society in ways that obscure its internal heterogeneity, including the unequal power relations they involve. Environmentalism as well as antienvironmentalism emerged from civil society, albeit in the latter case, in large part, because of powerful economic actors’ ability to defend their perceived interests.

The tendency to celebrate “civil society” without attending to the role of power inequalities is also evident among scholars working at the intersection of science, technology, and policy studies: they tend to exclusively highlight the positive aspects of increased public participation in the scientific process. Daniel Kleinman’s edited volume *Science, Technology, and Democracy* is a case in point: None of the contributions include discussion of problems and failures of efforts to open deliberations on scientific matters to greater participation, a fact a reviewer interpreted as an “apparent inclination” on their part “to see public participation in the scientific process as an inherently positive development” (Aronson 2003).²⁴

One might also question the extent to which citizens care to be involved in decision making. The example of the United States reveals that although

legal structures may allow participation and, hence, democratize decision making, this potential is not necessarily optimized. Beyond those with vested interests, “the people” may not care to be mobilized; contrary to prevailing assumptions about governance in democracies, members of the general citizenry do not, in fact, decide on a day-to-day basis all that the government does, nor do they necessarily care to do so (Schattschneider [1960] 1975). Studies of U.S. regulatory processes similarly reveal public participation to be limited; public interest groups rarely attend routine advisory committee meetings, while industries are well represented (Jasanoff [1990] 1994, 229, 247). Jasanoff identifies resource inequities as an important reason for this (pp. 229, 247), returning our focus to the constraint money and power inequities place on democratic structures.

Conclusion

Theories of reflexive modernization are assets in the important project to reduce technocracy and elitism by rendering decision making more democratic and robust. This study of U.S. climate politics highlights obstacles to the kind of democratic transformation of decision making posited by Ulrich Beck and others, however; it reveals complexities and inequities of power that need to be treated as starting point challenges in the U.S. context. These obstacles suggest the need for a more level political playing field in terms of access to power and influence. They also suggest the good sense in privileging knowledge on the basis of whether it is based on peer-reviewed science, whether it is balanced, and whether it is promoted by self-interested political and financial elites.

However, the above criteria are not easily applied to knowledge claims advanced by means of public relations campaigns designed to deceive rather than engage and fully educate the public. The threat such campaigns pose to democracy and equality is profound, not the least because they feed off of and reinforce cultural dispositions in U.S. society to venerate science without fully understanding both its strengths and its limits. In our media age, symbols of science, whether white lab coats or non-peer-reviewed articles formatted to appear as peer-reviewed ones, are easily mobilized to “conjure science” and disseminate one-sided and even dishonest understandings of scientific reality. Even without such in(ter)ventions, scientists, lay persons, and governmental officials alike pick and choose among the heterogeneity of scientific evidence and voices on the climate issue in ways that suit their belief structures. They often fail to discriminate between better and worse sources of scientific information on the basis of the (not infallible) strengths

of peer review, upholding instead their preferred interpretation as “the truth.” To be effective, reflexive modernization institutions need to find ways to discriminate between better and worse sources of scientific claims related to environmental reality and to be especially critical of “authoritative” black box opinions disseminated by vested financial and political interests and by the politicians who serve these elite interests.

Sensitivity to the limits of science and to the elusiveness of an objective standpoint is imperative in contemporary science- and technology-dependent societies. Such sensitivity reduces the play of manipulative objectivist claims in U.S. climate politics and in science-based controversies as a whole. Western scientific knowledge has important limitations (Long Martello 2001; Scott 1998; Visvanathan 1997), and a struggle should continue toward inclusion of other types of knowledge. Purported scientific claims, as well as claims to expertise, need to be critically examined, not passively accepted; the contingent, negotiated character of both need to be recognized, leaving room for critical discussion. Such discussion will necessarily have to involve deliberation on better and worse sources of knowledge, despite the non-transcendent, faulty, and contingent nature of such demarcations.

As shown by countless social studies of science, science is intimately and inextricably interlinked with politics, and no transcendent definitions exist by which to distinguish true science from “pseudoscience.” Even peer-reviewed science produced by means of the scientific method of hypothesis, experimentation, and falsification is liable to error. But it is nevertheless a particularly rigorous basis for the production of knowledge, and it can and should enjoy greater consideration relative to claims that not only are produced by less rigorous methods but also are paid by, and designed to benefit, financial and political elites over the general good. As responsible citizens, we must learn how to recognize the difference and to define the general good by means of truly participatory processes.

Notes

1. Another central reason why science becomes reflexive is new, widespread awareness of the dual nature of science as cause of environmental degradation and risks but also as a tool by which to identify and potentially alleviate the degradation and associated risks.

2. For analyses of some of the limits to the value neutrality and inclusiveness on the part of the Intergovernmental Panel on Climate Change (IPCC), see, among others, Boehmer-Christiansen 1994a, 1994b; Fogel 2002; Wynne 1994. For a response to Boehmer-Christiansen, see Moss 1995.

3. The two 1998 polls were conducted by the Program on International Policy Attitudes (PIPA), which researches public attitudes on international issues by conducting nationwide polls, focus groups, and comprehensive reviews of polling conducted by other organizations.

PIPA is a joint program of the Center on Policy Attitudes (COPA) and the Center for International and Security Studies at Maryland (CISSM), School of Public Affairs, University of Maryland.

4. Occasionally, skeptical scientists within the mainstream have been enrolled in the oppositional campaigns of the cadre of high-profile critics of concern and policy action on behalf of human-induced climate change. For example, two petition campaigns (in 1992 and 1996, respectively) orchestrated by atmospheric physicist S. Fred Singer's organization the Science and Environmental Policy Project (SEPP) featured a fair number of meteorologists. The petitions protested IPCC claims of a scientific consensus on the climate issue, expressed skepticism of the evidence of human-induced climate change, and urged government not to undertake hasty action on the issue. Some of the signatories had Ph.D.s as well as climate-relevant expertise, including a few synoptically trained meteorologists with potential to offer insight into some of the weaknesses of global climate models (see Lahsen forthcoming). Overall, however, efforts to attract new Ph.D.s to the ranks of outspoken critics of policy action on behalf of human-induced climate change have met with limited success, despite the concerted efforts on the part of vested interests and political elites (Cushman 1998). I base this statement on ten years of research involving monitoring of media articles and events on the climate issue as well as more than a hundred interviews among U.S. scientists involved with the climate issue or knowledgeable about U.S. climate science and politics. This research suggests that only a few new actors have joined the ranks of the staunch scientific skeptics on the climate issue since it gained widespread attention in the late 1980s.

5. Numerous high-ranked officers in the Clinton-Gore administration sought to dismiss all critics of the climate paradigm as "pseudoscientists" (Babbitt 1997).

6. In 2001, Lindzen said, "I cannot stress this enough. We are not in a position to confidently attribute past climate change to carbon dioxide or to forecast what the climate will be in the future. . . . One reason for this uncertainty is that . . . the climate is always changing; change is the norm" (*New York Post* 2001).

7. See McCright and Dunlap's (2000) analysis and description of the counterclaims made by the conservative movement regarding global warming.

8. Yaron Ezrahi (1990) persuasively argues that this is a common feature of liberal-democratic societies.

9. Under sponsorship by companies with vested interests against decreased reliance on fossil fuels, Lindzen made this statement at 1995 public hearing in Minnesota that focused on the environmental costs of coal burning by power plants (Gelbspan 1997, 39).

10. Social psychological studies by Kahneman, Slovic, and Tversky (1982) have shown this resilience of interpretive frameworks but do not concern themselves with cultural dimensions as such.

11. See also Angela Liberatore (2004). Liberatore makes a similar argument in the context of her discussion of the role of expertise in the Directorate General for Research within the European Commission.

12. Rather than distinguishing in terms of "types of experts," as Turner does, it may be more useful to identify the processes with which they are identified, namely, deliberate concealment; any single person may be a different type of expert in Turner's classification scheme, depending on the processes in which he or she participates at any particular moment.

13. These documents were written when the organization's name was Informed Citizens for the Environment.

14. See, for instance, *World Climate Report* (2001) and "Agenda 21: It's Not Hidden" (1994). See also the example of Fred S. Singer described below. This publication, edited by Patrick Michaels, first appeared under the name of *World Climate Review* as a quarterly newsletter. In

1995, its name was changed to *World Climate Report* when it began to be issued on a biweekly basis.

15. Stephen Schneider, 1998 presentation at the University of Colorado in Boulder, Colorado (n.d.).

16. The Marshall Institute Web site (<http://www.marshall.org>, accessed August 2000) reads, "The need for accurate and impartial technical assessments has never been greater. However, even purely scientific appraisals are often politicized and misused by interest groups. The Marshall Institute seeks to counter this trend by providing policymakers with rigorous, clearly written and unbiased technical analyses on a range of public policy issues. Through briefings to the press, publication programs, speaking tours and public forums, the Institute seeks to preserve the integrity of science and promote scientific literacy."

17. This observation is made by Pieterse (2001) and is backed up by United Nations Global Environmental Outlook (2000).

18. The National Center for Responsive Philanthropy found that from 1992 to 1994 alone, twelve conservative foundations poured approximately \$80 million into conservative think tanks and advocacy organizations, for which environmental issues have become an important target (McCright 1998, 61).

19. Not all conservatives agree with the Republican agenda against environmental policy. For a conservative critique of the latter, see Bliese (2001).

20. Nor did a series of Congressional hearings investigating the "scientific integrity" identify any actual cases of scientific fraud, unacceptable conduct by individuals or institutions, or breakdown in the scientific process (Brown 1996, 9).

21. The charges were widely publicized in large part because of the prominence of the scientist who advanced them—namely, Frederick Seitz, who also served as figure head in the 1998 Petition Campaign. Not a climate expert nor an active scientist, Seitz had not attended this or other IPCC meetings. The basis for his charges was a document produced by the Global Climate Coalition (Lahsen 1998).

22. With the exception of a technical comment in *Science*, Singer had not published peer-reviewed articles on the ozone issue as of 1996 (Brown 1996, footnote 26).

23. See Singer (1991). In this piece as elsewhere, Singer's strong antiregulatory views are expressed with rhetoric reminiscent of cold war anticommunism. Singer writes, "Why do so many different groups focus on greenhouse warming? Because the issue provides a wonderful excuse for doing things that they already want to do, under the guise of saving the planet. . . . More dangerous are those who have a hidden political agenda, most often oriented against business, the free market, and the capitalistic system. Of course, after the collapse of socialism in Eastern Europe it is no longer fashionable to argue for state ownership of industrial concerns. The alternative is to control private firms by regulating every step of every manufacturing process" (pp. 45-46). In this same context, Singer criticizes those using global warming as a vehicle for international action, "preferably with lots of treaties and protocols to control CO₂ or perhaps even methane," or who view the issue as "a launch platform for an ambitious foreign aid program" (pp. 45-46). Elsewhere, Singer has described the IPCC as an institution aiding such efforts and suggested that climate change is a plot by "Third World kleptocrats" to find new excuses to demand money from the West (Singer 1992).

24. For a provocative critique of the term *civil society*, see Samuel (2003). For a definition of *civil society*, see the European Commission report "Consultation and Participation of Civil Society" (available at http://europa.eu.int/comm/governance/areas/group3/report_en.pdf).

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