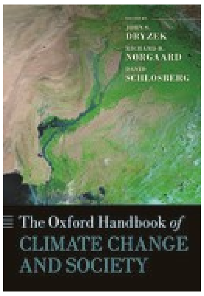

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CHAPTER

9 Cosmopolitan Knowledge: Climate Science and Global Civic Epistemology

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Abstract

This article lays out an analytic framework that explains why consensus building on responses to climate change cannot proceed through the institutions of science alone but requires a more differentiated and more culturally sensitive approach to confronting the climate phenomenon. It begins by placing science itself in a changing historical context, in which the ideal of science as a detached, curiosity-driven inquiry, guided by truthfulness to nature, has gradually yielded to the social reality of sciences that are more problem driven and politically accountable. It then draws on comparative studies of three national science and decision-making cultures (US, UK, and Germany) to show how the credibility of public knowledge claims relates to long-established, culturally situated practices of interpretation and reasoning. It concludes with reflections on the institutional changes that will be needed to build robust cosmopolitan knowledge for collective action on climate change and other global problems.

Keywords: cosmopolitan, cosmopolitanism, global civic epistemology, universalism, cosmopolitan knowledge

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1 Introduction

WORLD opinion divided on why the 15th Conference of the Parties (COP-15) under the United Nations Framework Convention on Climate Change (UNFCC), held in Copenhagen on 7–19 December 2010, failed. But one conclusion mustered almost universal agreement: COP-15 cut short any hope of vigorous forward movement to curb greenhouse gas emissions worldwide. Political reactions to COP-15 remained as fractured as the pre-COP-15 attempts to forge a climate policy consensus. Some seemed to give up on the very prospect of multilateralism, recommending instead a recourse to 'minilateralism' (Naím 2009), led by a small number of powerful, presumably like-minded, states that might build consensus more effectively than the unruly UN community. For analysts of climate politics, however, this turn to the pragmatics of negotiation seems premature. Much remains to be explored about the reasons for the lack of political action on what many view as *the* question for human survival in the twenty-first century. Analytically and normatively, a few steps backward may be necessary before plotting the next steps forward.

Among the unresolved questions exposed by the great Copenhagen fizzle of 2009 is a crucial one for science policy. Climate change should have presented, from one viewpoint, an easy case for global policy making. In the arena of environmental politics, it was long assumed that uncertainty about natural phenomena produces policy disarray; by the same token, scientific agreement was thought to facilitate action by positioning all actors on a baseline of shared knowledge. On this view, climate change should have moved by the turn of the century toward the low-conflict, strong-consensus end of the political action spectrum. Unlike many
p. 130 environmental problems that are hedged around with seemingly unresolvable unknowns, climate ↳ change appears to rest on a rock-solid consensus among those most qualified to judge (Anderegg et al. 2010; Oreskes 2007, 2004). There is remarkably little scientific dissent around the claim that the earth is warming dangerously as a consequence of human activity, specifically the release of gaseous carbon into the atmosphere. That consensus, moreover, is supported by one of the most inclusive and transparent exercises in international scientific consensus building the world has yet seen, through the successive assessment reports of the Intergovernmental Panel on Climate Change (IPCC). Most scientists who challenge the consensus position have well-documented ties to corporate interests that should have deprived them of all credibility (Oreskes and Conway 2010).

Why, then, has political consensus failed to follow where science leads? A popular line of argument blames poorly informed public opinion, fed by the petroleum industry′s manufactured uncertainties and the news media′s irresponsible exaggeration of dissent. Scientists′ response to this analysis has been, on the one hand, to attack the integrity of the opposition, vehemently insisting on the strength of the consensus and the absence of any intellectually credible opposition, and, on the other, to bemoan the public′s lack of scientific understanding, especially of probabilistic, temporally distant threats. In this self-defensive project, scientists enthusiastically embraced the work of historians of science such as Naomi Oreskes and Erik Conway, which not only provided quantitative evidence of agreement but joined the climate science elite in urging policy makers to take heed. As Oreskes (2004) put it: 'But there is a scientific consensus on the reality of anthropogenic climate change. Climate scientists have repeatedly tried to make this clear. It is time for the rest of us to listen.' Among influential politicians, former Vice President Al Gore notably did listen, repeatedly invoking Orseskes′ work (though not citing her by name) to support his often-stated confidence in the strength of the science, as in his award-winning documentary *An Inconvenient Truth*.

The problem for social analysis, however, lies elsewhere. Decades of work in studies of scientific controversies have established that the credibility of science depends not only on the strength of internal consensus among scientists, as measured by objective and supposedly context-independent criteria, but as much or more on the persuasive power of the people and institutions who speak for science (Irwin and Wynne 1996). Indeed, this capacity to persuade appears to have been the foundation of scientific authority from the earliest times (Shapin 1994; Shapin and Schaffer 1985). If experts and institutions are trusted, then their claims may be accepted on faith even if contrary assertions circulate in public discourse; if such bodies lose public confidence, then the mere fact of strong internal agreement will not be enough to carry conviction for outsiders. Put differently, convergence in scientists′ understanding of the facts is not the same thing as public assent to those understandings. Factors conditioning the reception and uptake of scientific claims by lay publics operate to some extent independently of the dynamics of knowledge production within scientific communities. Such predispositions, moreover, are especially likely to manifest themselves at moments of conflict or controversy.

These observations raise special difficulties for policy making on international and global problems such as climate change. Trust and credibility, as social achievements, are necessarily inflected by culture. Markers of trustworthiness depend on contexts of interpretation: a persuasive salesperson in one cultural setting may well come across as a hypocrite or charlatan in another. How to build scientific credibility across international p. 131 public arenas ↳ emerges, then, as a conceptual and practical challenge in its own right. The mere fact that scientists are speaking as if with one voice on a particular issue may be highly relevant, but not dispositive, when it comes to persuading global publics of the need to act. Scientific consensus becomes one factor among many in the circulation of signs, symbols, and meanings that bring collectives together into anything resembling an 'epistemic community' (Haas 1990). As the noted sociologist Neil Smelser (1986: 26) observed in a National Academies report on the social and behavioral sciences:

> Social problems, then, can be defined by the presence of 'objective facts' only if there is consensus about the meaning and significance of those facts…That kind of consensus rarely exists. We now know that social problems are not matters of objective fact but matters of an uncertain, disputed set of both facts and principles. Recognizing this, we can appreciate why such a large proportion of the debates about social problems are debates not about the existence of facts but about symbols, about the legitimacy of the competing sets of criteria by which a factual situation will or will not qualify as a genuine social problem.

In this chapter, I lay out an analytic framework that allows us to see why consensus building on responses to climate change cannot proceed through the institutions of science alone but requires a more differentiated and more culturally sensitive—indeed, more *cosmopolitan*—approach to confronting the climate phenomenon (Jasanoff 2010a).

Cosmopolitanism in its dictionary definition means the quality of being 'free from local, provincial, or national ideas, prejudices, or attachments,' and 'at home all over the world.'[1] This state of transcendence over local particularities has generated a large literature in philosophy and social theory, examining the pros and cons of seeking to eliminate or rise above difference, especially differences of nationality and culture (Beck 2006; Rorty 1991). Most writers recognize that the claim to cosmopolitanism may entail a false universalism, denying or denigrating differences that should be respected and that legitimately matter to others. Science, however, is taken by most of its practitioners to be unproblematically cosmopolitan, speaking the truths of nature in the same register, with equal force and conviction, to all people everywhere. Yet this assumption flies in the face of evidence from countless controversies surrounding policy-relevant knowledge claims. Science, I argue, risks becoming parochial, like a bumbling tourist in a strange land, when it is generated and put to use without attentiveness to contexts of interpretation. Global problems demand a more plastic approach, sensitized to the situated character of all knowledge claims and to the performative and persuasive demands of reasoning for culturally diverse audiences.

I begin by placing science itself in a changing historical context, in which the ideal of science as a detached, curiosity-driven inquiry, guided by truthfulness to nature, has gradually yielded to the social reality of sciences that are more problem driven and politically accountable. I then draw on comparative studies of three national science and decision-making cultures (US, UK, and Germany) to show how the credibility of public knowledge claims relates to long-established, culturally situated practices of interpretation and reasoning. I conclude with reflections on the institutional changes that will be needed to build robust cosmopolitan knowledge for collective action on climate change and other global problems.

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2 Public Science: A Conceptual History

Theorizing the role of science in public life has long roots. It reaches back if one is philosophically inclined to Aristotle's reflections on oligarchy, or government by the few. Those few in ancient times comprised mainly rich and powerful families, entitled by birth to rule. In the modern world challenges to democracy come not only from the thin stratum of the super-rich but also from a much wider array of experts who command specialist knowledge in the technical fields that increasingly underwrite public policy (Price 1965). By what right do those experts shape policy, and how do we account for their legitimacy?

We need not return to ancient Greece in search of answers. A sea-change in the role of experts occurred in most technologically advanced nations following the Second World War, justifying a rather more historically compressed narrative. Since the mid-twentieth century, science has become an immensely more pervasive presence in political life, both as an eager recipient of public funds and as a crucial provider of technical knowledge to governments. Theoretical understandings of the science–society–politics relationship have also evolved, giving rise to three partially overlapping and partially distinct framings through which to examine the scientific debates around climate change.

Mid-century views about the scientific enterprise were influentially captured by the American sociologist Robert K. Merton (1942) in a well-known essay on the normative structure of science. Scientists, in Merton's view, are institutionally conditioned to abide by certain distinctive norms that become a part of the 'scientific conscience,' arousing collective 'moral indignation' when they are violated. The four elements of the scientific ethos that Merton identified—communalism, universalism, disinterestedness, and organized skepticism—ensure that scientists will share results, eschew parochialism, avoid contaminating political or financial ties, and hold each others' work to impartial critical scrutiny. Widely accepted by scientists, politicians, and the public as an accurate characterization of science, Merton's norms served as the basis for what we may call the 'separatist model' of science in society. On this view, science is a realm apart: it can be trusted to operate largely on its own, setting its own research priorities, and organizing or regulating its internal conflicts, held adequately in check by nature and peer criticism, without need of significant external supervision. Most important for our purposes, science in this model is always already cosmopolitan, because it purveys truths underwritten by a nature that is stable, unchanging, and identical for all. Science merely discloses that universal reality: when consensus is reached, in Oreskes' words, 'It is time for the rest of us to listen.'

Science's institutional relationships changed with the advent of major public funding programs, such as those of the National Science Foundation and the National Institutes of Health in the United States. Publics underwriting research with substantial tax revenues acquired a stake in what science produces, just as science acquired stakes in making its findings useful as a basis for continued public support. At the same time, the number and variety of scientific advisory bodies assisting governments multiplied.[2] With growing entanglement between science and politics came a further reevaluation of the science–policy relationship, leading in purest form to what has been called the 'linear model' (Pielke 2007). This view acknowledges that science has a useful role to play in society, by finding relevant facts and informing policy makers, but these are merely inputs, untouched by the p. 133 ↳ later political tasks of balancing information with other relevant factors to arrive at public decisions. The governance implications of the linear model were articulated by the US National Research Council (NRC 1983) in a report on risk analysis that still exercises far-reaching influence on regulatory discourse and decisions. Briefly, the NRC recommended that the scientific aspects of assessing risk should be kept apart from the value-laden task of managing risk, an injunction that became almost a mantra for regulators seeking to shore up their legitimacy in areas of uncertain, contested knowledge. Indeed, one can discern the impact of the NRC's boundary drawing in the IPCC's repeated claim that its mission is to provide scientific, technical, and socio-economic information that is policy-relevant but policy-neutral, that is, not 'policy prescriptive.' On this view, science generated for policy can be cosmopolitan so long as parochial political biases are not allowed to enter into its production.

Both the separatist and the linear model of science in relation to policy and politics continue to enjoy wide circulation in public discourse. At the same time, a more complex and interactive account of that relationship has been recognized in the academic literature and partly reflected in policy practice. In one well-known articulation, contemporary science is seen as subject to an altogether different set of imperatives, producing a culture in which older Mertonian norms have at best attenuated significance. Labeled Mode 2 (Gibbons et al. 1994), this model characterizes large components of scientific production as more interdisciplinary, institutionally dispersed, context dependent, and problem oriented than in earlier times. Mode 2 science responds to social problems; its very reason for being originates outside the communities of curiosity-driven research. In these domains, claims to the virtues of communalism, universalism, and disinterestedness are offset by pressures to be practical, useful, goal directed, and accountable to publics, political sponsors and industrial patrons. Much policy-relevant science, including such second-order scientific activities as the IPCC's climate assessments,[3] can properly be characterized as Mode 2. Given the potentially high stakes associated with its production, the legitimacy of this kind of knowledge necessarily depends on engagements with audiences beyond tightly bounded, disciplinary scientific communities (Jasanoff 1990, 2010b).

In the twenty-first century, numerous states and supra-state entities, especially in the European region, recognized the need for wider public consultation, and undertook varied efforts to engage citizens in the steering of science. For the most part, such tactics were targeted to emerging sciences and technologies, in order to forestall the stubborn resistance that greeted crop biotechnology at the turn of the century and nuclear power a generation earlier. Democratization efforts, in other words, filtered upstream into the processes of scientific discovery and invention, chiefly for purposes of shoring up the legitimacy of public funding for science—by seeking citizen acquiescence well in advance of widespread commercial applications. Largely absent from these initiatives was an attention to the democratization of public reasoning based on scientific and technical expertise, let alone to the problems of expert credibility that have arisen in relation to transboundary problems such as AIDS, ozone depletion, and climate change. How can or should global entities such as the IPCC seek legitimation in the eyes of global publics? What are the obstacles to building cosmopolitan knowledge on problems of worldwide spread and significance? Some answers to these rarely articulated questions can be found in the comparative politics of health, safety, and environmental regulation.

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3 Climate Science and National Civic Epistemologies

An important finding of the field of science and technology studies over the last several decades is that claims about nature, like claims about any aspect of human life, win social acceptance only as a result of intensive preparatory work. The credibility of scientific facts rests not only on their conformance with well-established research paradigms (Kuhn 1962), but also on steps taken to make those facts visible, tangible, and comprehensible to those not immediately engaged in a particular piece of research. Scientists use instruments, measurements, visualization techniques, specialized languages, and many other agreed-upon conventions to let nature speak, as it were, 'for itself' (Latour 1987). It may take years of conflict and negotiation to establish such conventions in emerging research areas, and specific assertions may generate persistent controversies or be overturned by later results. Yet, as long as scientific production remains a largely in-house affair, conducted by and for scientists themselves, such struggles remain mostly invisible except to insiders. The institutional authority of science as ultimate purveyor of truth is not affected by its internal conflicts.

The credibility landscape shifts considerably when science goes public, whether because the claims are extraordinary (as in the case of cold fusion in the 1980s), or because they challenge deeply acculturated views of reality and thereby arouse resistance (as in the well-known case of American creationists), or because the new reality calls on people to change prior expectations and behaviors, as with most modern findings of environmental risk. In all these situations, science faces a double bind—not only the hard problem of consensus building within (and, in Mode 2 science, also across) relevant disciplinary communities, but additionally the harder problem of gaining public acceptance for claims that have destabilized settled social relations and ways of living. For global problems such as climate change, the second hurdle looms especially large, because the processes of testing and accounting for policy-relevant scientific claims vary substantially across countries. In particular, modern polities have developed what I have elsewhere called 'civic epistemologies,' or publicly accepted and procedurally sanctioned ways of testing and absorbing the epistemic basis for decision making (Jasanoff 2005: 247–71). Even Western nation-states with shared or intertwined histories of cultural and political development diverge in their public knowledge ways. Thumbnail sketches of US, British, and German responses to climate science over the course of the IPCC assessments illustrate the point.

3.1 United States

Analyses grounded in international relations and negotiation theory have not been able to account for the prevalence or persistence of climate skepticism in the United States. The nearest approach to explanation, as already noted, is to blame powerful corporate interests, chiefly the oil industry, for sowing the seeds of doubt by funding scientists to question the growing scientific consensus on anthropogenic climate change (Oreskes and Conway 2010). In brief, so the story goes, this lobby manufactured uncertainty by buying, or bending, science to support its political interests. Many US scientists, historians, and activists have condemned this cynical
p. 135 politicization of science and the power of moneyed ↳ lobbies to buy political support with distorted facts (Schrag 2006; Schneider 2009). But granting the reality of lobbies and of science for hire, a question still hangs uneasily in the air. Why did the anti-climate consensus lobby gain such powerful adherents in the US Congress, the White House, and large segments of the American public? Why then such striking differences in the intensity and duration of public controversy? Multinational corporations, after all, spread their messages everywhere, and there are no glaring differences between the United States and other Western countries in either media coverage of scientific controversies or the public understanding of science.

A more complete answer requires us to look not only at the circumstances of knowledge production (e.g. partisan funding of science), but also at the institutions and practices that condition receptivity toward public knowledge claims of any kind—in short, the dominant forms of a nation's civic epistemology. Such public knowledge ways consist of established commitments to particular forms of evidence garnering, argument, and demonstrations of reasonableness. In America's decision-making culture, founded on the common law's adversary system, information is typically generated by interested parties and tested in public through overt confrontation between opposing, interest-laden points of view. Underlying this approach is a somewhat paradoxical epistemic theory that places science above values and preferences, in keeping with Mertonian norms, but presupposes that the best way to attain unvarnished or disinterested truths is to display, and then eliminate, bias through the adversarial give and take of competing expert assertions.

The theory 'works' in practice because the American system has also created numerous procedures and institutions designed specifically to mitigate or end lengthy epistemic conflicts.[4] These include expert advisory committees (Jasanoff 1990), regulatory agencies with power to evaluate competing arguments, and of course a multi-tiered judicial system that frequently acts as the arbiter of last resort. Controversies that scientists cannot solve by themselves may nevertheless end for all practical purposes through the combined operation of these legal or political closure mechanisms. A case in point is the US Supreme Court's important decision in *Massachusetts v EPA*, 549 US 497 (2007), holding that climate science was compelling enough to require the US

Environmental Protection Agency to take note, and to explain why it had failed to regulate greenhouse gases as air pollutants under the Clean Air Act. The Court in effect partially overrode US climate skeptics' attempts to stall the regulation of CO_2, and it did so by declaring that going against the international consensus without explanation was irrational.

Returning, then, to the persistent public controversy over anthropogenic climate change, it becomes apparent that the IPCC's carefully constructed procedures for seeking peer review failed to answer adequately to US traditions of achieving knowledge closure—traditions constitutive of American civic epistemology. Two comparisons, with Britain and Germany, underscore this point and help to guide our thinking about the role of science in future climate negotiations.

3.2 Britain

In contrast to American public knowledge making, which privileges adversarial give and take, the British approach has historically been more consensual. Underlying Britain's construction of public reason is a long-standing commitment to empirical observation and p. 136 ↳ commonsense proofs, attested to by persons with an authorized right to see on behalf of the people (Jasanoff 2005). Two rooted elements of British political culture thereby come into somewhat paradoxical alignment: on the one hand, a long history of government by elites, under the aegis of monarchical rule, and on the other validation of the facts of the matter through references to common, even populist, practices of seeing and witnessing (Shapin and Schaffer 1985). Ruling elites, in other words, are held accountable to popularly accepted criteria of epistemic validity when presenting public proofs. At the same time, the decision maker's capacity to speak on behalf of the people is never taken for granted, but must be demonstrated through accredited social markers, which importantly include a record of public service and problem solving. Britain's meritocratic culture of 'the great and the good' elevates just such well-tested people ('safe hands' as they are often called) to positions of high authority.

The defining features of British civic epistemology have manifested themselves repeatedly in developments surrounding climate science. To begin with, traditions of trusted epistemic consensus-building 'worked' in the sense that neither policy makers nor the public displayed the ugly rift between conviction and skepticism that marked the US political debate. On the rare occasions when questions of scientific reliability did spill into the open, they were resolved in a matter-of-fact fashion that upheld both the right to question and the basic sturdiness of the consensus. Thus, a British citizen's challenge to the UK government for distributing *An Inconvenient Truth* for showing in schools failed to convince a high court that the film was propaganda and should be suppressed.[5] Instead, in *Dimmock v Secretary of State for Education and Skills,* [2007] EWHC 2288 (Admin), Justice Michael Burton took evidence on several specific allegations of misrepresentation. His decision faulted the film for nine instances of factual inaccuracy (the 'nine errors') and ordered that these be flagged in guidance notes accompanying future educational showings of the film.

A bigger furor greeted the independent television station Channel 4's airing of the skeptical documentary, *The Great Global Warming Swindle*, in March 2007. Asked to investigate, Ofcom, the UK watchdog agency for telecommunications, upheld the principle of open debate on important public issues but also acknowledged the mainstream character of the anthropogenic climate change hypothesis.[6] Ofcom expressed overall confidence in the British public's ability to assess the statements made in the program in the light of already available information:

> The anthropogenic global warming theory is extremely well represented in the mainstream media. A large number of television programmes, news reports, press articles and, indeed, feature length films have adopted the premise that global warming is caused by man-made carbon dioxide. In light of this it is reasonable for the programme makers to assume that the likely audience would have a basic

> understanding of the mainstream man-made global warming theory, and would be able to assess the arguments presented in the programme in order to form their own opinion.[7]

Ofcom, in short, both responded to and reaffirmed a civic epistemology accustomed to weighing and balancing empirical facts in public circulation. In this respect, the Ofcom decision rejected the 'deficit model'—a model of public ignorance and unreason—historically embraced by segments of the UK government (Irwin and Wynne 1996).

p. 137 Confidence in facts and their facticity, however, demands a corresponding confidence in the trustworthiness of fact makers, and this foundation stone of Britain's civic epistemology was severely tested in the episode dubbed 'climategate.' The trigger was the disclosure in November 2009, weeks before the Copenhagen COP-15 meeting, of some 1,000 e-mails from the computers of the respected Climatic Research Unit (CRU) at the University of East Anglia. The hacked messages showed scientists expressing disrespect for holders of dissenting opinions, refusing to share data with known opponents, and possibly even doctoring their data to overstate the case for global warming. Pressed by instant uproar on the internet and intense (though, in many scientists′ view, unmerited) media scrutiny, the UK House of Commons undertook an inquiry into CRU′s research practices to determine whether breaches of scientific integrity had taken place. The Select Committee on Science and Technology explicitly avoided assessing the science itself, focusing instead on the CRU researchers′ motives and actions—and it acquitted the principals of wrongdoing: 'We believe that the focus on CRU and Professor Phil Jones, Director of CRU, in particular, has largely been misplaced' (UK House of Commons 2010: 3). That personal exoneration conformed well to a culture of public reasoning in which trust crucially depends on the capacity of the state and its advisors to see, and speak, honestly for the people (Jasanoff 2005). Though a gaunt and visibly strained Phil Jones was harshly grilled during the inquiry, the parliamentarians eventually pinned blame on sloppy institutional practices rather than on individual misbehavior.

Despite the absence of rampant, US-style public skepticism, an empiricist distrust of untested and overextended models remains alive in British climate discourse, together with an acute awareness of uncertainties—and the consequent interpenetration of scientific assessment and public values. This residual skepticism toward *all* model-based predictions may account for the acceptance of worst-case economic scenarios in the famous Stern Report (2005) prepared for the UK government by its chief economic advisor, Sir Nicholas Stern. Instructively, leading US economists criticized Stern′s projections as speculative and bordering on philosophy rather than disciplined, scientific prediction (Nordhaus 2007). And contrasting with US climate scientists′ insistence that the strength of the climate consensus is alone sufficient to drive urgent action, prominent UK experts advocated less science-centric approaches, looking instead toward alleviating human vulnerability as a problem on its own (Hulme 2009). This position crystallized in the Hartwell Paper (Prins et al. 2010). Coordinated through the London School of Economics and co-authored by well-known UK and US science policy analysts, this report recommended reframing climate policy as not being about carbon emissions at all, but as a question of human dignity, access to energy, and the Earth′s survival.

3.3 Germany

The German case provides a counterpoint to the British and American ones, and accentuates from a non-Anglo-American cultural context the importance of civic epistemologies in shaping national responses to the science and policy of climate change. The climate issue had been brewing at various levels in Germany for decades, through concerns about above-ground nuclear tests, cloud seeding, and the oil shocks of the 1970s (Cavender and Jäger 1993). But it broke upon German consciousness in the mid-1980s as part of a wider wave of p. 138 ↳ concern about technological risk and a world tilting toward unmanageable dangers. The 1986 Chernobyl nuclear accident provided a peg on which to hang these formless fears. A sign of the times was the runaway success of an academic sociological text that no one suspected would turn into a bestseller: Ulrich Beck's now famous *Risk Society* (1992 [1986]). Around the same time, on 11 August 1986, Germany's leading weekly news magazine, *Der Spiegel*, published a cover story that captured with an unforgettable image one dimension of the anxiety that Beck had also tapped into. It was a picture of the twin towers of Cologne's iconic cathedral rising above the waters of the North Sea that had already claimed the rest of the building. The story was starkly titled *Klimakatastrophe*, or 'climate catastrophe,' a term first coined by a subgroup of the German Physical Society (Beck 2004) that remains current in German but has not caught on in other languages or nations.

That postwar Germany remains economically, socially, and technologically risk averse needs little elaboration here. Important to note, though, is that the idea of catastrophic climate change took hold in the German context with virtually no public debate about the strength of the scientific evidence. It was as if the picture made famous by the *Spiegel* cover, of a building that stands for German strength in adversity, fed into a national consciousness already scarred and sensitized by similar images of disaster—which in the aftermath of the Second World War prominently featured broken and destroyed churches. Indeed, images of a devastated Cologne, with the silhouette of the bombed church rising above the city's ruins, were familiar to most Germans who came of age in that period. Sudden and complete wreckage of civilization as we know it was not something late twentieth-century Germans found hard to imagine. The bigger challenge was how to avoid falling into the vortex of destruction and overwhelming loss that the nation knew too well, and feared profoundly.

In Germany's national civic epistemology, building communally crafted expert rationales, capable of supporting a policy consensus, offers protection against a psychologically and politically debilitating risk consciousness. On climate change as on a host of regulatory issues, long-standing administrative practices came into play, along with newly elaborated traditions of constitutional government, to achieve just this result. A key mechanism for producing technically grounded policy consensus in Germany is the parliamentary inquiry commission (*Enquete Kommission*), a hybrid decision-making forum that combines scientific expertise and political representation within a single advisory body (see e.g. NRC 2007: 90–2). An inquiry commission on 'Preventive Measures to Protect the Earth's Atmosphere' (*Vorsorge zum Schutz der Erdatmosphäre*) was appointed in 1987 and renewed in the next parliamentary election period. One of its major political achievements was to keep anti-regulatory forces from upsetting the scientific consensus on climate. The commission's third report, issued in 1990, endorsed the theory of anthropogenic climate change, attributing already observed atmospheric warming and sea-level rises to that phenomenon. The report also recommended a 30 percent reduction in carbon dioxide emissions below 1987 levels by 2005, a goal the cabinet reduced to a more feasible 25 percent (Enquete Kommission 1991 [German version 1990]; Cavender and Jäger 1993: 13–14). Noteworthy, especially in the light of the US case, was the virtual absence of scientific or political conflict over the reality of human-induced global warming itself.

The 2009 brouhaha over the hacked University of East Anglia e-mails did not leave German climate science unscathed, but there was no public backing off by scientists or politicians from the consensus on the need for emission reductions. A few visible scientists, notably Hans von Storch of Hamburg University's Meteorological Institute, tried to frame p. 139 ↳ the episode as a wake-up call to restore the IPCC's credibility through an independent review process that might even include skeptics (Evers et al. 2010). Von Storch's reaction is consistent with an epistemic and political culture that leans toward the inclusion of all relevant viewpoints, even if it means sacrificing strict scientific purity. Illustrating a sharp difference of cultures, a review of climate assessments by the US National Research Council faulted the German inquiry commission for precisely this tendency: selecting experts through parliament rather than through scientific bodies, the NRC noted, 'could have some significant ramifications in terms of the credibility and legitimacy of the process' (NRC 2007: 92). Yet the hybrid politico-scientific position produced in Germany proved in this case more resistant to challenge than the corresponding expert determinations in the United States or Britain.

Chancellor Angela Merkel's decision early in her second term to reverse Germany's planned nuclear phase-out, and the sharp nationwide protests triggered by that policy reversal, offer powerful evidence of the strength of the climate accord and of a felt rejection of important norms of German civic epistemology by the ruling party. Merkel's Christian Democrats believed that they could take advantage of the public's still solid belief in the climate crisis to (again) throw support behind the nuclear industry, which had been clamoring for a comeback throughout the Western world. But vociferous criticism and the sudden remarkable rise in popularity of the Green Party (which achieved parity in some 2010 polls with the Social Democrats) showed that Merkel may have miscalculated the strength of Germany's nuclear-free vision, as well as underestimated the need to include anti-nuclear advocates in any reforged consensus around nuclear energy. Her government was attacked for violating powerful norms of democratic accountability. At the dawn of the twenty-first century's second decade, then, not climate skeptics but nuclear skeptics sounded the loudest notes of dissonance in German environmental and energy policy. It was in energy policy, rather than climate per se, that German consensus-building efforts had failed to produce the customary socio-technical accord.

4 Building Cosmopolitan Knowledge

When like cases pattern unlike, the divergence cries out for elucidation. The ups and downs of climate science in the public spheres of the three Western nations discussed above provide a telling example. The United States, Britain, and Germany seem at one level to share all of the epistemic, technological, and political characteristics that should have pushed them toward similar understandings of climate science and similar actions on climate policy. Each boasts a strong, homegrown research tradition on climate change, a highly educated citizenry, multiple pathways for civic engagement, vigorous news media with the capacity to report on science and technology, and—not least—ample representation of its scientists in the workings of the IPCC. Each national economy depends on high levels of energy use, producing greenhouse gas emissions, and each nation has invested with varying degrees of enthusiasm in renewable energy technologies. Nuclear power was embraced by policy makers and dogged by continual citizen protest in each. Nonetheless, debate on climate issues has diverged across even these 'like' countries, indicating that the passage from technical assessment to the public
p. 140 sphere to policy choice is anything but ↳ linear, predictable, or deterministic. Comparison of these three cases suggests instead that global environmental policy making—especially around the climate threat—needs to take serious account of deep-seated national ways of knowing and acting, in short, of multiple civic epistemologies (Jasanoff 2005).

Our examples show that public reasoning, a process that all democratic societies are committed to in avoidance of arbitrary power, depends on prior criteria of what counts as valid reason. In societies infused with science and technology, those criteria importantly relate to the reception and uptake of scientific evidence by citizens and policy makers, and this is where political culture steps in. Believing in something so complex and multidimensional as climate change, let alone believing strongly enough to undertake urgent action, requires considerable faith in what I have called the 'wisdom of strangers.' Others' judgment, not our own, lays the groundwork for many collective decisions in the modern world, and the conventions by which we evaluate those judgments are part and parcel of our political cultures. Schematically speaking, scientific and technical judgments are exercised at the level of the individual expert, the discipline or specialty, and the advisory bodies that help translate technical knowledge to policy domains (Jasanoff 2010b). The importance accorded to each layer of judgment, however, differs across countries, as the three cases discussed above illustrate in almost ideal-typical fashion. Disciplinary norms uncontaminated by overt interest count most in the United States; the probity of individual experts is the prime focus of concern in Britain; and the capacity to form inclusive consensus positions functions as a *sine qua non* of stability and closure in German policy making.

If three closely similar nation-states, sharing hundreds of years of Enlightenment history, can diverge so much in their modes of linking knowledge to action, with seemingly dismal consequences for policy coordination, what hope is there for collective, knowledge-based action at the far more heterogeneous, indeed cacophonous, global level? Is it not inevitable that the world will stall on endless 'debates not about the existence of facts but about symbols, about the legitimacy of the competing sets of criteria by which a factual situation [in this case the reality of climate change] will or will not qualify as a genuine social problem' (Smelser 1986: 26)? Isn't minilateralism, after all, the only realistic answer? These are weighty questions, and cautious optimism is the best that can be offered against a future of scientific and political uncertainty, but the bright arrows, those pointing toward possibilities for global cooperation and stewardship respectful of democratic values, are worth rehearsing in conclusion.

First, in the examples above, we note that each nation's political system has put methods in place for confronting and resolving technical disputes and for moving ahead with policy implementation even in situations of unresolved uncertainty. Second, though their accountability mechanisms vary cross-nationally, each nation accepts in principle that governmental decisions must be explained in ways deemed acceptable by the public. Third, no exception is made for technical decisions: whether through administrative rule making (US), consultation (UK), or parliamentary inquiries (Germany), each state has found ways to engage its citizens, directly or indirectly, in the substance of technically grounded decisions, such as policies for climate change. In these circumstances, perhaps the greatest threat to collective action is to strive for an artificial separation of scientific assessment, in keeping with the separatist and linear models, from considerations of credibility, p. 141 accountability, and persuasiveness. Arguably, the InterAcademy Council ↳ (2010) formed in the wake of 'climategate' represented such an inward-looking response to the crisis of faith on climate science. This was an effort to shore up science's internal accounting processes and to make them more transparent, which as we have seen is a necessary but not sufficient condition for the production of cosmopolitan policy-relevant knowledge. Minilateralism fares no better, judged by standards of enlightened democracy: indeed, one can regard it as the political counterpart to scientific parochialism.

The need disclosed by decades of debate on climate science is for stronger processes of mediation and translation woven into the processes of knowledge making itself. The history of the climate controversy illustrates the limitations of separatist and linear thinking about science in a time characterized by ever greater interpenetration of knowledge and values, in a world that deeply respects scientific knowledge but follows its implicit normative dictates only when science is ratified by diverse civic epistemologies. The histories recounted above suggest that procedures akin to the German parliamentary inquiry model—though critiqued by adherents of the linear paradigm as too 'politicizing'—may hold more promise for a global world than approaches that stress the purified integrity of experts and disciplines to the detriment of plurality of opinion. But the German model did not spring from nowhere; it, too, was forged in a historical tradition including two traumatic world wars that sensitized a nation to the perils of excluding dissent. On climate change, one hopes that building cosmopolitan knowledge that recognizes and respects justifiable differences will come at lesser cost. It should not take a holocaust.

Notes

1. See 〈http://dictionary.reference.com/browse/cosmopolitan〉.

2. At the end of 1972, a possible high water mark, there were some 1,400 federal advisory committees in existence in the United States. *Federal Advisory Committees*, *First Annual Report of the President*, 29 March 1973, p. 1. By the end of 1998, following years of deregulation and belt tightening in the federal government, the number stood at a still significant 892. *Twenty-Seventh Annual Report of the President on Federal Advisory Committees*, 1 March 1999, p. 7.

3. IPCC assessments do not produce original research. Rather, they provide original and comprehensive syntheses of data already in the public scientific record. In this sense they can be referred to as 'second-order' science—consisting neither of basic research nor technological applications, but requiring sophisticated interdisciplinary scientific judgment for its production (Mitchell et al. 2006).

4. Without these closure mechanisms, public science tends to spiral into the infinite deconstruction of 'experimenters' regress', which involves opponents continually challenging the assumptions underlying each other's claims (Collins 1985). America's long-running science controversies, such as that over creationism, points to the absence of credible closure devices. Why some protracted controversies close (e.g. over the health effects of tobacco or asbestos) and others do not requires case-by-case analysis.

5. Although the lawsuit was nominally brought by Stewart Dimmock, a truck driver and member of a political party known p. 142 for climate skepticism, his action was financially backed ↳ by Christopher Walter, Third Viscount Monckton of Brenchley, a conservative hereditary peer and noted critic of the theory of anthropogenic climate change.

6. From the Ofcom decision: 'Ofcom considers it of paramount importance that broadcasters, such as Channel 4, continue to explore controversial subject matter. While such programmes can polarise opinion, they are essential to our understanding of the world around us and are amongst the most important content that broadcasters produce.' Broadcast Bulletin Issue number 114–21|07|08, 〈http://stakeholders.ofcom.org.uk/enforcement/broadcast-bulletins/obb114/〉.

7. Broadcast Bulletin Issue number 114–21|07|08.

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