

History of Science and American Science Policy

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ABSTRACT

Historians of science have participated actively in debates over American science policy in the post–World War II period in a variety of ways, but their impact has been more to elucidate general concepts than to effect specific policy changes. Personal experiences, in the case of the debate over global warming, have demonstrated both the value and the limits of such involvement for the making of public policy. To be effective, historians of science need to strive for clarity in public expression, to accept the importance of engaging with the public at all levels and through diverse media, and, above all, to recognize that the nature of such debates will make normal scholarly nuance hard to achieve. Moreover, in the current political climate, historians may be surprised to find themselves defending sciences, when the usual stance of historians is to be critical.

IN *THINKING IN TIME*, an acclaimed study of “the uses of history” in public policy first published in 1986, the political scientist Richard E. Neustadt and the historian Ernest R. May, both of Harvard, contended that “despite themselves Washington decision-makers actually used history in their decisions . . . whether they knew any or not.” They included among such decision makers and their aides scientists who “may know next to nothing of the history of science.” Given this, they argued, policy makers should deploy a critically examined rather than superficial version of history, with as much assistance from professional historians as possible. John Heilbron, delivering the History of Science Society Distinguished Lecture that same year, echoed Neustadt and May in calling on historians of science to offer more authentic versions of history to scientist-administrators and other policy makers: “It is time to build the channels through which relevant and relevantly packaged research results of historians, philosophers, and sociologists of science and technology may flow to policy makers. . . . Let us come to the aid of our perplexed brethren in the sciences.”¹

How have historians of science responded to the call for more active participation in

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¹ Richard E. Neustadt and Ernest R. May, *Thinking in Time: The Uses of History for Decision Makers* (New

policy making? What can we learn from their experiences in terms of both the value and the limits of such historical advising in the policy process? And is it possible to provide authentic history in policy-relevant packages, or are those two desiderata mutually exclusive?

In this essay we revisit the role of historians of science in American science policy in the postwar period and provide a self-reflection on the personal experiences of one of us (Naomi Oreskes). We are happy to report that on those occasions when historians of science have been called on to make contributions to science policy, they have performed in a way that has brought credit to the discipline. Policy makers have generally welcomed their participation in the policy process, presumably owing to their perceived independence from both scientific and political communities and their ability to frame immediate questions in broader context. But opportunities for direct involvement in science policy have remained scarce. Experience further suggests that historians who have taken up the demand have struggled to balance subtlety with clarity, nuanced appraisal with straight talk. Authentic policy-relevant history is not an oxymoron, but it is a challenge.

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Neustadt, May, and Heilbron were right in arguing that scientists and science administrators had often deployed history in making or justifying policy. In 1957, for example, two different historical analogies were offered to describe the challenge presented by the Soviet launch of its satellite *Sputnik*. On the one hand, I. I. Rabi, a politically moderate physicist and chairman of the Science Advisory Committee of the Office of Defense Mobilization in the Executive Office of the President, told President Dwight Eisenhower that *Sputnik* reminded him of developments in the early twentieth century, when the United States began to surpass Europe in science: “Unless we take vigorous actions [the Soviets] could pass us swiftly just as in a period of twenty to thirty years we caught up with Europe and left Western Europe far behind.” On the other hand, Edward Teller, the politically conservative “father” of the American hydrogen bomb, declared that with the launch of *Sputnik* the United States had lost “a battle more important and greater than Pearl Harbor.”²

Both analogies were intended to spur action, but along different lines. Rabi’s comparison of the circumstances leading to *Sputnik* with the general rise of American science implied the need for broadly increased federal support to basic research and education. In contrast, Teller’s analogy with Pearl Harbor evoked an immediate military crisis demanding an urgent military response; he called for a massive buildup in the American thermonuclear weapons program.³ In both cases historical analogies were deployed for presentist goals, with little regard to—or concern for—critical differences in the respective historical contexts.

Was *Sputnik* evidence of a broader rise of Soviet science, as Rabi suggested, or a military crisis, as Teller warned? The Soviets did make strides in the 1950s and 1960s, but in the end *Sputnik* and other Soviet space achievements turned out to be exceptions among

York: Free Press, 1986), on pp. xii, 245; and J. L. Heilbron, “Applied History of Science,” *Isis*, 1987, 78:552–563 (the published version of his 1986 lecture), on p. 562.

² For Rabi’s view see A. J. Goodpaster, “Memorandum of Conference with the President, October 15, 1967,” 16 Oct. 1957, in *The Diaries of Dwight D. Eisenhower, 1953–1961*, ed. Robert Lester, microfilm, 28 reels (Frederick, Md.: Univ. Publications America, 1986), reel 14, frames 783–786, on frame 784; for Teller’s reading see Allen Drury, “Missile Inquiry Will Open Today: To Hear Teller,” *New York Times*, 25 Nov. 1957, pp. 1, 14, on p. 1.

³ Edward Teller, “We Must Win the H-War Before It Starts,” *Los Angeles Times*, 13 Oct. 1957, p. M8.

overall Soviet scientific and technological capabilities. Within weeks of taking over the White House, John Kennedy and his advisors realized that the much-feared Soviet–American “missile gap” *did* exist—but that it favored the United States. By the mid-1960s, visiting American scientists had already concluded that the centralized Soviet system hampered technological and economic development and that the USSR lagged the West in technology in general.⁴ One should not, of course, fault Rabi for failing to predict the future, but it is safe to say that his analogy was based more on his personal experiences than on any careful historical analysis of the similarities and differences between the American–European scientific competition in the 1920s and the U.S.–Soviet rivalry in the 1950s. Likewise, Teller’s Pearl Harbor analogy, while highlighting *Sputnik*’s psychological impact, ignored the vast differences in the political and military contexts of World War II and the Cold War.

Could a historian of science have done better? One tried. A. Hunter Dupree, a history professor at the University of California, Berkeley, believed that his historical background and professional detachment from the scientists had prepared him to deal with these *Sputnik*-inspired science policy questions in broader perspective. A pioneer in the historical study of American science policy, he had just published *Science in the Federal Government*, a National Science Foundation–commissioned study of federal science policy and programs. Dupree, a U.S. historian, clashed with his Berkeley colleague Thomas Kuhn over whether one could excel as a historian of science without professional training in the sciences, but he was supported by Glenn T. Seaborg, a nuclear chemist and Berkeley chancellor from 1958 to 1961.⁵ In 1959 Dupree was invited to testify in Congress on proposals for the establishment of a Department of Science and Technology as a response to the *Sputnik* challenge. He prepared his testimony in light of the historical experiences of scientists in government, especially Vannevar Bush’s service as director of the Office of Scientific Research and Development and Franklin Roosevelt’s *de facto* science advisor. Despite its appeal to some scientists and many Democrats in Congress, a Department of Science and Technology would be ineffective and unnecessary, Dupree concluded. Instead, he argued for continuation of the flexible science advisory and policy system at the presidential level that had already emerged in *Sputnik*’s wake. Did Dupree’s views decisively affect the fate of the proposal? There is little evidence to suggest that they did; opposition from the Eisenhower administration and from the scientific establishment ensured that the idea went nowhere.⁶ But Dupree did present a historian’s independent voice in the public debate.

As a historian of science in the federal government, Dupree felt allegiance to the long-term stable relations of science and government, which he viewed as independent of

⁴ Donald F. Hornig, “Official Visit of Donald F. Hornig to the USSR, November 5–20, 1964,” 9 Dec. 1964; and Emanuel Piore, “Electronics Research and Technology in the USSR,” 2 Nov. 1964; both in the online database Declassified Documents Reference System (DDRS), published by Gale Company.

⁵ A. Hunter Dupree, *Science in the Federal Government: A History of Policies and Actions* (Cambridge, Mass.: Harvard Univ. Press, Belknap, 1957). For Seaborg’s support see entry dated 22 Dec. 1960, in Glenn T. Seaborg, *Journal of Glenn T. Seaborg: Berkeley Chancellor*, 3 vols. (Berkeley, Calif.: Lawrence Berkeley Laboratory, 1987), Vol. 3, p. 33 of December 1960.

⁶ A. Hunter Dupree, testimony in Senate Committee on Government Operations, Subcommittee on Reorganization and International Organization, *Create a Department of Science and Technology—Hearings*, 86th Cong., 1st sess., Pts. 1 and 2 (Washington, D.C.: Government Printing Office, 1959), pp. 84–89. See also Dupree, “A Historian’s View of Advice to the President on Science: Retrospect and Prescription,” in *Science Advice to the President*, ed. William T. Golden (New York: Pergamon, 1980), pp. 175–190. On the debates over *Sputnik* and the Department of Science see Zuoyue Wang, *In Sputnik’s Shadow: The President’s Science Advisory Committee and Cold War America* (New Brunswick, N.J.: Rutgers Univ. Press, 2008).

both partisan politics and the scientific establishment. This position caused him great distress in the late 1960s. A political moderate, he viewed campus radical movements as threatening the government–university partnership that he had promoted and perhaps, with his work, even helped to strengthen. “There was a definite anti-science bias to the Free Speech Movement,” he felt. On the other hand, he also blamed the scientific establishment for its failure to be “more responsive to the moral and ethical issues raised” by the movement.⁷

Over time Dupree became more unhappy with the scientific establishment—particularly during the Nixon years, when the president downgraded science advising in the White House in the aftermath of controversies over the supersonic transport and the development of antiballistic missile systems. Leading scientists were reluctant to “rock the boat,” Dupree observed, lest matters go from bad to worse, but he felt they were wrong not to stand up and be counted and that history vindicated scientists who had done so in the past. Here history gave Dupree a vantage point from which to stand apart from the scientists’ views: “I went ahead and said what I had to say from the point of view of historical perspective and without regard to the signals of a science establishment to which I did not belong.” In 1980 he called for the broadening of presidential science advising to include “an ecological, an anthropological, and a historical perspective”—a view that most close presidential advisors, nearly all of them physical scientists, did not share.⁸

A generation later, the historical perspective remains absent from the formal presidential science advisory system, but historians of science and technology have still found ways to influence policy, particularly as it pertains to support of scientific research. In 1985–1986, a House of Representatives Task Force on Science Policy of the Committee on Science and Technology commissioned Jeffrey Stine to write a succinct history of American science policy since World War II. In related hearings, historians of science and technology such as Alex Roland, Thomas Haskell, and Daniel Kevles testified before the task force, addressing both components of what is conventionally called science policy: “science in policy” (how government used science in its various activities) and “policy for science” (how government supported science).⁹

In their congressional appearances, these historians of science and technology found themselves in a remarkably similar position to that of Dupree some years earlier: they sought to strike a position in general sympathy with scientists but also to maintain a distinctive voice based on their historical perspectives and expertise. Testifying on the “Goals and Objectives of National Science Policy,” Roland, for example, agreed with the scientists who had testified that the federal government should support a full range of scientific activities, but he also chastised the scientists (and the government) for hiding

⁷ Dupree, “Historian’s View of Advice to the President on Science,” p. 186.

⁸ *Ibid.*, pp. 188, 190.

⁹ Jeffrey K. Stine, *A History of Science Policy in the United States, 1940–1985*, Science Policy Study Background Report No. 1, Report Prepared for the Task Force on Science Policy, Committee on Science and Technology, House of Representatives, 99th Cong., 2nd sess. (Washington, D.C.: Government Printing Office, 1986). Roland’s testimony appeared in *Science Policy Study—Hearings*, Vol. 1: *Goals and Objectives of National Science Policy*, Hearings before the Task Force on Science Policy of the Committee on Science and Technology, House of Representatives, 99th Cong., 1st sess. (Washington, D.C.: Government Printing Office, 1986), pp. 17–49. The testimonies of Haskell and Kevles appeared in *Science Policy Study—Hearings*, Vol. 8: *Science in the Political Process*, Hearings before the Task Force on Science Policy of the Committee on Science and Technology, House of Representatives, 99th Cong., 1st sess. (Washington, D.C.: Government Printing Office, 1986), pp. 1–19 (Haskell), 157–177 (Kevles).

“pure science” behind the pragmatic cover of “basic research”—a practice that can be traced at least to Vannevar Bush’s famous *Science, the Endless Frontier* report of 1945.¹⁰

Roland argued that the government should unapologetically support basic scientific investigations. “Just as we support, however modestly, the humanities and the arts,” Roland argued, “so too in principle should we support the investigation of nature as an end in itself.” He also justified federal support of social sciences, along with natural science, the humanities, and the arts, not because they would produce practical applications but because they were “hallmarks of a vital and curious society where understanding is its own reward.” In his testimony on the question of “Science in the Political Process,” Thomas Haskell, a historian of American social science, not only endorsed the value of science but defended its need for considerable autonomy and discretion. Citing Charles Sanders Peirce and Thomas Kuhn, Haskell highlighted peer review as the right basis for choosing scientific research directions. While conceding that “science should not be simply allowed to go its own way, according to its own inner logic, so far as the general public should not be obliged to pay for just whatever scientists want to do,” he nevertheless insisted that neither should Congress intervene in the internal mechanism of science. Daniel Kevles similarly argued that there would always be a tension between an elitist science policy aimed at “the highest quality science” and a democratic process concerned with equitable distribution of federal funds. Both were legitimate objectives, but he advised against any illusion Congress might have about reconciling the two easily.¹¹

Most task force members expressed their appreciation for the historians’ role in bringing about a new understanding of the subject of science policy itself, but it is not clear that any of them experienced a change of heart or mind as a result of the testimony they heard. Neither do we have evidence that the historians had any other direct impact on science policy. Rather, as in Dupree’s case, the historians’ contributions evidently lay more in the area of lending a broad historical perspective to issues in science policy than in effecting any specific policy changes.

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In these cases, historians appeared in Congress as nonpolitical witnesses called upon to give their views on general issues in science policy. Most congressional hearings, however—especially in the recent period—have taken place in more highly partisan contexts. Can historians still present an independent voice, beholden to neither the political nor the scientific establishment, in such situations? Recently, one of us (Naomi Oreskes) had the opportunity to find out.

The topic was global warming, and the invitation came from the U.S. Senate Committee on Environment and Public Works, whose then-chairman, Oklahoma Senator James Inhofe, had publicly declared more than once that global warming was a “hoax.”¹² The occasion was the third in a series of hearings the Republican senator had called to try to

¹⁰ Vannevar Bush, *Science, the Endless Frontier: A Report to the President* (Washington, D.C.: Government Printing Office, 1945).

¹¹ Roland testimony, pp. 22–23; Haskell testimony, p. 8; and Kevles testimony, pp. 160–161. Kevles also used his congressional appearance to advocate for congressional recognition of the value of the history of science and for an increase in federal funding for the field. See Daniel Kevles to Don Fuqua, chairman of the House Task Force, 12 Aug. 1985; his letter is included as part of his testimony (pp. 173–174).

¹² See, e.g., Andrew C. Revkin, “Politics Reasserts Itself in the Debate over Climate Change and Its Hazards,” *New York Times*, 5 Aug., 2003.

expose the alleged errors of the scientific community and the media in their representations about the conclusions of climate science.

In hindsight, much of what Oreskes observed may seem obvious, particularly to anyone who has been directly involved in the legislative process or who has studied the interface of science and government. Still, it is one thing to know, as a historian, that all discussions of science take place in a social and political context; it is another actually to witness that context unfolding or to be made, personally, a part of it.

In the lead-up to the hearings, several things quickly became evident. First, witnesses represent a side; there were at this hearing no nonaligned members. Each of them had been invited to play a specific role, supporting a specific position. Scientists would unhesitatingly reject the notion of “Democratic” or “Republican” science, yet at the hearing there were “Democratic” witnesses and “Republican” witnesses, arrayed at the table in alternating positions. Since the Republicans were at the time in the majority, they got three witnesses to the Democrats’ two. At no time was Oreskes explicitly asked to defend any particular position, but given her previous writings on the subject it was clear that she was being invited to represent a particular point: that scientific experts are not in doubt that global warming is occurring and that it is largely caused by greenhouse gas emissions from burning fossil fuels. Since she had made this claim in peer-reviewed publications, defending it did not present a practical or moral challenge; but one could imagine other, less comfortable, possibilities, and the worry that comments could and would be taken out of context and misrepresented was ever present.¹³

A second, closely related point that immediately became clear was that Senate hearings are not fact-finding missions—or at least this one was not. The chairman was using his position to make an explicit argument—that the media had been snookered by the scientific community—and the other side of the aisle was fighting back, insisting that the media representation of the issue was fair or had even overrepresented “contrarian” views (that is, views “contrary” to those held in the mainstream research community). Neither side appeared particularly interested in asking questions, other than rhetorical ones, or in learning something new; both were interested in scoring political points and undermining their opponents.

Third, congressional hearings (or, again, at least this one) are performances. Statements are made for the record, to be quoted by reporters in attendance or to be seen on television (if only on C-Span). Most of the questions posed were leading ones; many senators posed no questions at all—they simply made statements. And nearly all the questions and statements were addressed to each side’s own witnesses, providing them the opportunity to give answers that were, of course, anticipated.

Fourth, the entire proceeding had the quality of a sports event, with both sides competing to score points and then lining up at the end to shake hands as the witnesses walked past each other in opposite directions. At the end, one felt that some participants did indeed view the event as a game, standing ready to play again in the next round. But for a historian who believes that there are historical facts supported by documentary evidence, and that despite the latitude of historical interpretation some positions are

¹³ For an earlier publication see Naomi Oreskes, “The Scientific Consensus on Climate Change,” *Science*, 2004, 306:1686. For the Senate testimony see Oreskes, “Testimony before the Committee on Environment and Public Works [of the] United States Senate,” 6 Dec. 2006, available from the committee’s Web site at http://epw.senate.gov/109th/Oreskes_Testimony.pdf. A video of the hearing, including Oreskes’s testimony, is available at <http://epw.senate.gov/epwmultimedia/epw120606.ram>.

simply incompatible with that evidence, this sat rather uneasily on the plane ride home. (It continues to do so more than a year later.)

The sporting event quality also sat uneasily with this particular historian's respect for the hard-won results of decades of scientific investigation. All historians, sociologists, and philosophers know that scientific evidence is fallible; yet we also know the tremendous seriousness with which scientists attempt to ascertain truths about the natural world. The work that goes into studying a complex issue such as anthropogenic climate change over the course of several decades is scarcely trivial. Moreover, global warming is an issue with far-reaching ramifications for both human and nonhuman communities—potentially far greater, for example, than whether or not the U.S. federal government finances stem-cell research—and it was frankly shocking to see U.S. senators blithely dismissing it. Imagine, if you will, senators not simply arguing that stem-cell research should not be pursued with public funds but, rather, arguing that stem cells do not actually *exist*.

What useful role can a historian play in such a context, politicized to the point of surrealism? Was testifying a waste of time? Should a conscientious historian decline to participate in such a show? No, we don't think so, because the audience involved is larger than the senators on the committee, larger than the audience physically present in the room. All testimony goes into the Congressional Record and is there for policy makers, opinion makers, and the public to read in the future. It becomes, at least potentially, part of the public debate. When reporters called in the months that followed, Oreskes could refer them to her Senate testimony, which clearly carried more weight and generated more interest than if she had referred them to an academic paper, no matter how revered the journal.

And there was one rather delicious moment, when Oreskes quoted from a 1965 special message to Congress, discovered by Zuoyue Wang in the course of his research on presidential science advising, in which Lyndon B. Johnson discussed global warming. "This generation has altered the composition of the atmosphere on a global scale through . . . a steady increase in carbon dioxide through the burning of fossil fuels," Johnson declared. At that moment, there seemed to be just the slightest glimmer of surprise—even acknowledgment—in the eyes of one Republican senator. Maybe one senator did learn something that day. Oreskes's account of the long history of serious scientific concerns about global warming, communicated by scientists to U.S. presidents since Lyndon Johnson, has surprised many people and may have played some role in the shift in press coverage and public opinion that took place in 2006–2007.¹⁴

There is one more point to be made. All the witnesses at this global warming hearing were individuals who had already taken public positions; Oreskes had published op-ed pieces in the *Washington Post*, the *Los Angeles Times*, and the *San Francisco Chronicle*.¹⁵ Historians who would like to have the opportunity to participate in public debate might therefore begin by offering op-ed pieces to local and national newspapers and otherwise taking part in various policy forums. Certainly, there are a large number of issues about

¹⁴ According to a survey in July 2007, more than two thirds of Americans believed that global warming was happening, that human activities were mainly or partially responsible for it, and that the issue would be a consideration in their votes in the 2008 presidential election. It also found that the percentage of Americans who believed that global warming was already having or would soon have dangerous impacts on people had increased from about 28 percent in 2004 to 48 percent in 2007. See Anthony Leiserowitz *et al.*, "American Opinions on Global Warming," <http://environment.yale.edu/news/Research/5305/american-opinions-on-global-warming/> [accessed 2008].

¹⁵ Naomi Oreskes, "The Long Consensus on Climate Change," *Washington Post*, 1 Feb. 2007, p. A15; Oreskes, "Global Warming—Signed, Sealed, and Delivered," *Los Angeles Times*, 24 July 2006, p. B11; and Oreskes, "'Fear'-Mongering Crichton Wrong on Science," *San Francisco Chronicle*, 16 Feb. 2005, p. B11.

which we know a great deal, and the world might benefit from hearing more of what we have to say.

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We have focused on the involvement of academic historians in legislative science policy, but there are many other ways for historians of science to interface with science and policy. Historians and scholars with training in the history of science have worked effectively at various levels and in all branches of the federal government as agency historians, analysts, and staff members. An especially valuable venue has been the Congressional Science Fellows programs, administered by the American Association for the Advancement of Science and sponsored by dozens of natural and social scientific organizations, including the American Historical Association. In this capacity, a number of distinguished historians of science—among them Jane Maienschein, Jeffrey Stine, and James Fleming—have contributed to public policy not in front of but behind congressional committees.¹⁶ The fruits of their labors, whether in the form of agency histories, background studies, or policy analysis and advice, have helped to inform policy makers and the public. Equally valuable has been their perspective on how science works in society—including in Congress—and the role they have played in helping to bring other academic colleagues into the public sphere. The prominence of historians of science in the House Task Force on Science Policy investigation discussed above is owed in no small measure to the fact that the study director, John Holmfeld, was trained in the history of science and understood the relevance of potential contributions by professional historians of science.

However, despite its success in involving historians of science in science policy, the 1986 House Task Force investigation did not create sustained momentum in that direction. Perhaps this was because the task force was unusually deliberative; most policy issues in Congress or the executive branch are viewed as practical matters requiring immediate answers, not broad historical insights. Even situations that would seem to call for such broad insight may not enjoy the benefit of it. The influential 2005 National Academy of Sciences report *Rising above the Gathering Storm*, designed to justify a boost in federal funding for science and science education, would probably have benefited from a balanced historical perspective, but apparently no historians of science were invited to participate in the process.¹⁷

With some notable exceptions, the possibility of including a historian of science in their deliberations simply does not occur to most scientists and congressional leaders. But if historians begin to play a more active role in public debate—through letters to editors, op-ed pieces, and the placement of historians of science themselves in staff positions, for example—then perhaps more congressional staff and committee leaders will think of that possibility in the future. Yet if they do, the historians called upon will have to accept the unattractive, even disturbing, realities of the political process. In public debate, the

¹⁶ On the AAAS's Congressional Science and Engineering Fellows program see Jeffrey Stine, *Twenty Years of Science in the Public Interest: A History of the Congressional Science and Engineering Fellowship Program* (Washington, D.C.: American Association for the Advancement of Science, 1994). See also Daryl Chubin and Jane Maienschein, "Staffing Science Policy-Making," *Science*, 2000, 290:1501.

¹⁷ National Academy of Sciences Committee on Prospering in the Global Economy of the Twenty-first Century, *Rising above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future* (Washington, D.C.: National Academy Press, 2007). A pdf version can be downloaded at <http://www.nap.edu/catalog/11463.html>.

academic instinct for detail and nuance must give way, at least to some degree, to clarity and brevity. And the critical instinct that in our academic work often leads us to focus on the limits of science may, in the public sphere, lead us to the surprising role of trying to preserve, protect, and defend it.