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Mutating science: The politics of bio-technology

Betsi Beem, The University of Sydney

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Sheila Jasanoff *Designs on Nature: Science and Democracy in Europe and The United States*, Princeton, NJ, Princeton University Press, 2005 (344 pp). ISBN 0-69111-811-6 (hard cover) RRP \$94.95.

The second half of the 20th century saw the ascendance of the life sciences in nearly every facet of our lives, from the food we eat to the way we are born. The rise of life sciences began when James Watson and Francis Crick unravelled the mysteries of the DNA code in 1953. Twenty years later and across the Atlantic, scientists Stanley Cohen and Herbert Boyer invented the technique of transferring genetic material across species—launching the field of genetic engineering and the biotechnology industry. With these developments came the promise of a cornucopia of agricultural and biomedical advances and industrial applications. Advances in biotechnology have brought pest resistant crops that increase agricultural yield and decrease the need for chemical pesticides. The development of 'golden rice' in 1999 has the potential to reduce blindness in rice-based societies by increasing beta carotene production and accumulation in the edible part of the grain. In June 2006, the International Committee for Monitoring Assisted Reproductive Technologies reported that the number of children born through in vitro fertilisation and other assisted reproductive technologies reached approximately 200,000 per year world-wide (Adamson et al. 2006) and had topped 3 million since the first test tube baby, Louise Brown, was born in 1978. Proponents of stem cell research suggest that cures for Alzheimer's and Parkinson's diseases, spinal cord injuries, and degenerative organ conditions, are within reach.

Unsuited by the missteps of other sciences—the atomic bomb brought to us by physicists, or the horrors of mustard gas or dangers of pesticides developed by chemists—biotechnology promised hope and life. However, its emergence has been replete with contradictions and has fostered profound ethical and moral debates in countries around the globe. Reproductive technologies and embryonic stem cell research raise fundamental questions about when life actually begins. When does a cluster of cells become a human being that deserves to be protected under the law? If a woman carries a child in her womb that is the genetic product of another woman and man, whose child is it? Other biotech products raise equally challenging questions. What if genes from genetically modified crops are unintentionally introduced into the 'natural' environment, and cause serious ecological harm? Is the potential to alleviate hunger worth the risk?

By examining how different countries have wrestled with the complexities of biotechnology we can learn how social, scientific, and political processes respond to an ever changing knowledge base. Responses to biotechnology—for instance, supporting or curtailing the introduction of genetically modified organisms into the environment or stem cell research—have far reaching implications not only for human health and the environment, but also for democracy. How citizens come to understand these scientific advances, the avenues available for them to respond to and shape legislative and regulatory responses, and who they trust to speak authoritatively about the issues are important facets of political decision making involving biotechnology. These questions underpin Sheila Jasanoff's (2005) *Designs on Nature*.

SAME SCIENCE, DIFFERENT OUTCOMES

Jasanoff builds on sociologists' claims that societies once based on industry are now increasingly based on knowledge. In other words, the wealth of nations no longer rests on the exploitation of natural resources or production capabilities. Rather, it rests on *knowledge*—specifically scientific knowledge and technical expertise. In knowledge-based societies, she argues, 'knowledgeable individuals constitute possibly the most important form of capital' (p. 4)—and government policies increasingly reflect this development. As policies change, so too does the distribution of resources and the economic and political roles of science and industry. As Jasanoff puts it, these changes

A small icon of a globe showing the Americas, located at the top left of a grey text box.

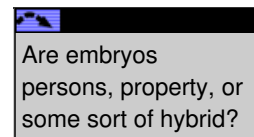
Responses to biotechnology have far reaching implications for human health and the environment.

'could hardly occur without wrenching political upheavals' (p. 4). And rather than similar advances in knowledge having similar impacts on societies, Jasanoff demonstrates that debates around developments in biotechnology played out quite differently in the United States, United Kingdom, and Germany. The puzzles that animate her research include:

Why, for instance, have agricultural biotechnology and [genetically modified] food not become openly controversial in the United States or Germany but to turn into matters of intense concern in Britain? How, to the contrary, did Britain succeed in carving out a relatively uncontested space for embryo research, while American politics on this issue remains deeply divided, and Germany refused to allow the most difficult choices to rise to political salience in the first place? Why is patenting life forms seen as an ethical issue in Europe, but not the United States? And what accounts for the fact that bioethics, simultaneously and energetically embraced as a policy discourse in the EU and in three sovereign nations, nevertheless is understood in vastly different ways in each of its contexts of development? (p. 9).

In examining these puzzles, Jasanoff develops three broad arguments. First, the emergence of knowledge societies has profound implications for democratic theory and practice. Ideals of citizenship, deliberation, and accountability cannot be fully realised without grappling with how knowledge is created and used in the policy process. Complex issues with science-based underpinnings such as biotechnology, global warming, and nuclear power require citizens to engage with sophisticated technical explanations of potential and existing social problems. Jasanoff demonstrates that a multifaceted array of new institutions and venues has emerged for knowledge creation, dissemination, contestation and transformation. Advisory committees are often convened to inform decision makers as to the shape of policy or alternative strategies. Who sits on these committees and the sources of their authority to recommend action have implications for outcomes. The courts, in some cases, are arbiters of whether or not new life forms (genetic manipulations) can be patented. Even 'the ephemeral web pages of environmental groups or multinational corporations' become sites of civic engagement as citizens seeking or creating new information exchange ideas and debate implications of biotechnological developments or policies aimed at either restricting or nurturing their advance.

Second, the politics of biotechnology is intertwined with 'reimagining nationhood at a critical juncture in world history'. Unsurprisingly, looming largest in Germany, Jasanoff argues that what is at stake in biotechnology debates is tied to 'reconstituting German identity after two world wars and the Holocaust' and to what German nationhood means in the process of increased Europeanisation (p. 7).




Jasanoff's third argument, and the one that I focus on here, concerns the role of 'political culture' in the course of these debates. For Jasanoff, political culture 'refers to the systematic means by which a political community makes binding collective choices' and 'includes the tacit, but nonetheless powerful, routines by which collective knowledge is produced and validated' (p 21). By examining political culture we can explain variation not only *between* countries, but also *within* countries. Jasanoff promises, for instance, that the concept of political culture gives us leverage in understanding why genetically modified foods were treated differently in the United States and United Kingdom—with little resistance in the former and intense debate in the latter—and in understanding why there was a shift in the United States from 'a once robust debate on environmental issues such as nuclear power and chemical pollution to a relatively complacent acceptance of the risks and benefits of genetic engineering' (p. 9).

While noting that political culture can be a 'slippery' concept to analysts, she argues that it is critical to understanding how the politics of biotechnology unfolded in these three arenas. To clarify the concept of political culture she considers the intertwined roles of framing, boundaries, institutional reasoning and discourse, and actors' identities. Framing refers to how an issue is defined for political action and becomes embedded in 'social behavior and material culture [and] fundamentally alters the way people's perceptions of what is real in the world around them' (p. 24). Similarly, boundary work refers to how essential social demarcations are created and maintained. Often made in governing institutions, social demarcations determine such thorny questions as the legal status of animals with altered genes—are they inventions for the purposes of patent law? Similarly, are embryos persons, property, or some sort of hybrid? Opening up the black box of institutions, Jasanoff builds on work of new institutionalists to study what institutions do, and how they embody meaning, create social relationships and symbolic orders. Finally, Jasanoff argues that biotechnology has given birth to a new suite of political actors such as formally organised

groups including IVF clinics or expert advisory committees; professional groups such as bio-ethicists; and social groups such as surrogate mothers' organisations.

How issues are initially framed in the three countries—in part a function of historical contingency and institutional design—is central to her story. How biotechnology was conceptualised in the early years is crucial. It was seen, to varying degrees, as a scientific *process*, as a stream of *products*, and as a *program* of governance and control. In each setting, the dominant framing bolstered very different legislative and administrative outcomes, which affected the future development of the industry, of the science, the political process, and how citizens participate.

For instance, in the United States the dominant frame emerged through a case before the Supreme Court in 1980 and was subsequently institutionalised in the Food and Drug Administration, the United States Department of Agriculture and the Environmental Protection Agency. The gist was that 'biotechnology was framed as just another industrial process, lacking any special attributes or consequences' (p. 52). It moved from the realm of participatory political decision making to the technical expertise of bureaucracies. What emerged as the focus of regulatory oversight were the final products' effects on human health, not the process by which they were made. In other words, if an ear of corn did not harm the person eating it, it mattered not if or how its genetic material had been altered.




In Germany citizens mistrust a cosy relationship between science and the state.

Britain, by contrast, developed a more inclusive frame for grappling with the introduction of biotechnology. Jasanoff demonstrates that this is partly because the process of decision making included a tripartite committee, the Genetic Manipulation Advisory Group (GMAG), which comprises representatives from labour and industry as well as government representatives from both local and national government. Additionally, European Community developments provided further impetus for legislative action. The result of these processes was greater attention to the process of developing GMOs and a more open admission of uncertainty about and consideration of the impacts of introducing exotics in the environment. Thus, the standing body that advises the British government on environmental issues, the Royal Commission on Environmental Pollution, considered the biological likelihood that resistant genes might spread to weedy species through natural pollination processes. They also were wary that introducing herbicide resistant plants might have the unintended consequence of leading to more intensive use of herbicides in the longer run. This focus led to heightened awareness of ethical social responsibilities to the planet and a broader scope of regulatory scrutiny in Britain than was seen in the product-oriented approach that prevailed in the United States.

In Germany, citizens' mistrust of a cosy relationship between science and the state, which was borne out of the atrocities of the Third Reich, demanded citizen involvement in scientific discourse and decision making. Genetic engineering as a program of state control had to be checked through the involvement of citizens and representative groups. The Greens' participation in the parliamentary Commission of Enquiry in the mid 1980s provided a forum to facilitate, at the highest levels of political discourse, a broader theme of biotechnology's social, political, and physical risks. In discussing the last twenty years of German science and innovation, Jasanoff points to stories of 'crisis and barely controlled decline', which scientists and internal observers note have 'to do with the impossible conditions for biotechnological research created through a mix of public hostility and responsive overregulation by a panicky government' (p. 242).

While not labelled as 'political culture,' Jasanoff's analysis parallels concepts that have received a wealth of scholarly attention in the field of political science, particularly in agenda setting. In particular, how issues are framed and defined as appropriate for government intervention, then embedded in political institutions or decision venues, underpins over a decade of research by Frank Baumgartner and Bryan Jones (1993; 2002; Jones & Baumgartner 2005; Jones 1995; 2001). Their model of punctuated equilibrium more explicitly accounts for the durability of frames and



In knowledge societies citizens are called upon to make decisions on complex technical issues.

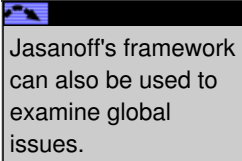
examines the factors that induce change in the policy process. Jasanoff does attend to the institutional settings, or policy venues, in which biotechnology decisions are made, but she does not marshal insights from existing research on agenda setting that more explicitly examines the interaction of venues and frames. Had she done so, her analysis of how institutions reinforce frames, restrict who has standing in particular decision venues and/or limit access to proponents of competing frames might have been more comprehensive, as would her account of how different frames may resonate positively or negatively in various arenas of political decision making. It is the relative power of these venues and their ability to control access and images, coupled with the

ability of strategic political actors to frame and either contain or expand the issue to the broader public or to other venues, which accounts for the persistence of some policies or change in others. For instance, if there is only one political decision arena that hears an issue, the frame embedded in that institution will most likely be more resilient to change. However, if an issue or alternative frame gains footing in other arenas, the likelihood of change increases. One can often observe 'venue shopping' by policy advocates using courts or alternative legislative committees to gain a hearing if they have been unsuccessful in other venues. Attention to how venues, as well as frames, compete in the political domain would have provided an even more robust analysis of biotechnology in the three countries.

CIVIC EPISTEMOLOGY

Jasanoff argues that citizens in modern knowledge societies are often called upon to make decisions on issues with highly technical and/or scientific bases. This requires citizens to have a sophisticated knowledge base to participate genuinely in making decisions. The question remains, just how do we know what we know and how does that form the basis for public engagement? Jasanoff eschews the notion of 'public understanding of science' because it takes as given the veracity and universality of scientific knowledge and assumes that if 'publics' simply overcome their 'ignorance' of scientific knowledge, then there will be 'no cross cultural variation in their perceptions of science and receptivity toward technology' (p. 250). Instead, she develops the concept of *civic epistemology* which does *not* take as given the authority of science, but instead poses the question of how scientific information or knowledge comes to be authoritative in political settings. In the same way she works to make the idea of 'political culture' easier to grasp, Jasanoff identifies interrelated dimensions of the concept of civic epistemology which helps put it into action. To understand how we, as societies, know what we know, she examines styles of public knowledge making, bases of trust or accountability, how objectivity is demonstrated, and foundations of expertise. In doing so, Jasanoff examines the social context of negotiating and renegotiating understandings or frames.

One of the ways she draws out national differences is by studying differences in the foundations of expertise. She finds that experts in the three countries are identified to varying degrees by their formal qualifications, and personal or institutional experience. In the United States, professional expertise looms large. The disinterested scientific expert, judged by his or her publications in peer reviewed journals, has authority to speak. To maintain authoritative status, scientists must remain above charges of political or industry capture. In the United States, a scientist perceived of as representing a particular interest—be it environmental, industrial, or religious—loses credibility. Expertise in Britain, by contrast, rests on professional competence *and* a strong profile of service to society. In other words, being a technical expert is insufficient to gain authority because 'the expert's function is to discern the public's needs and to define the public good as much as it is to provide appropriate technical knowledge and skills' (p. 268). Thus, a range of individuals, from Prince Charles to academic social scientists emerge as authoritative voices in policy debates. In Germany, expertise is less obviously personal, and there is more emphasis on institutional backing. Jasanoff traces this orientation to the horrors of charisma under Nazi rule and the foundational place of rationality in German politics. She argues that, for Germans, rationality flows from collective reasoning produced by authoritative bodies. As such, membership on various committees grappling with biotechnology issues often includes corporatist representatives from unions, environmental groups, industry, and research organisations.



Jasanoff's framework can also be used to examine global issues.

By drawing out the different ways that citizens engage with, try to understand, and come to trust or distrust science and technology in knowledge societies, Jasanoff provides a framework that can be used to examine a host of other issues. It can be marshalled to understand the essentially domestic debates in Australia about stem cell research, nuclear power, or even how to resolve the continuing problems associated with persistent drought conditions (that is, who speaks authoritatively for/against recycling water). But her framework can also be used to examine global issues. If we accept that different political cultures respond to different sources of authority, frame and understand seemingly straightforward technical issues in very different ways, and embed those frames in institutions that are not wholly responsive to changed understandings, then we need to accept and understand that international problems such as climate change require country specific approaches to create common understandings and solutions. How can/does the Intergovernmental Panel on Climate Change establish global authority? Is it direct, or mediated through actors who exhibit culturally specific sources of legitimacy? Does the lack of attention to culturally specific civic engagement and political processes partly explain failure in climate change

negotiations?

Jasanoff's book is an important and timely work, both substantively and theoretically. Those interested in biotechnology policies in any of the countries examined in this book will find an engaging and complete account of how they emerged and developed. While her concept of 'political culture' has less to do with culture and more to do with concepts of framing, venues, and institutionalisation, she makes a convincing argument that these mattered in the development of the various policies and polities around biotechnology. Finally, in developing a framework for understanding civic epistemologies, Jasanoff gives researchers interested in the intersection of science and politics a tool that shows promise for understanding how citizens wrestling difficult choices engage with the issues.

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Betsi Beem is a lecturer in The University of Sydney's Discipline of Government and International Relations. Her research interests include the intersection of science and policy making at international and national levels, issue framing and information processing by political actors and institutions, and policy dynamics.