SPECIAL SECTION

Science/technology as politics by other means

Edited by

Simone Abram

Introduction: science/technology as politics by other means

Simone Abram

Abstract: This article introduces a series of ideas about the categories of science and politics, by way of actor network theory, Gell's theories of index and agency, and governmentality studies. It explores the ways in which science has become a discursive element in contemporary government, and examines the tensions between the purifying categorizations of politics and science, and the re-embedding (or hybridizing) of science into national political discourse. What emerges is a series of practices by which science is nationalized, domesticating the ideal of a generalized science into localized political debates at both national and sub-national levels, practices which may be transformed at national boundaries. While we acknowledge that science in practice is not abstract or generalizable (since it must engage with a world which is not abstracted), it is the abstracting and purifying work attributed to science which makes it attractive as a political alibi for particular political projects. Rather than seeing science as politics by other means, perhaps we should be examining the creation of a rehybridized science-politics.

Keywords: nation, politics, science, technology

We know that science and technology are socially embodied, and that they follow their own patterns of rationality and logic. We also know that much governmental activity is channeled through apparently scientific forms. The theme for this collection, though, is the extent to which scientific or technological knowledges are surrogates for political argument.¹ That is, to what extent are technologies or scientific rationalities used in place of political or ideological argument in governing to define a realm of thought or discourse?

The question becomes apparent in, for example, conflicts over where developments are to be sited, where technical arguments over the best location for particular forms of infrastructure can come into conflict with arguments about the identity of places and of environmental and aesthetic quality. But scientific rationalities also dominate many other realms of governance, such as health or food policy. If we consider systems of knowledge such as accountancy and demographic projection as technologies, how do we then characterize governmental processes that

adopt these technologies as their rationality? How do technological details dominate political choices? Are scientific debates self-referential to the point where other factors (sacredness of sites, or genealogical claims) cannot be debated in the same arena? How can scientific or technological arguments be brought into political debates alongside other forms of rationality?

Increasing anthropological attention is paid to the critique of science, its genealogy, and archaeology in Foucauldian terms. Studies of science and technology have, to a great extent, examined not only the production of scientific facts, but also the socio-technical frameworks which support the widespread status of science as a belief system. In anthropological discussions, the epistemological category 'science' has often been set in opposition to forms of 'indigenous' knowledge. This is not surprising in a discipline whose origins lie in attempts to understand 'natives' in a world dominated by colonial systems. In response, post-colonial studies of science strive to 'provincialize' techno-scientific discourses and practices, decentering the place of science and its modernist imagination (W. Anderson 2002). Both anthropology and science studies have long striven to externalize science as a mode of thought and practice, and see techno-science itself as a heterogeneous set of 'native' activities.² Several generations of 'anthropologists at home' have problematized the generalizing notion of 'Western culture', and within it science, in what Abu-Lughod calls "this post-Orientalist, postcolonial-critique-of-anthropology, post-crisis-of-the-authority-of-science age" (Abu-Lughod 1997: 128).

However, the extent to which the authority of science has actually been decentered is at least partially related to which kind of science we are referring to and in what environment. Despite claims that general public trust in scientific advice is in decline, it is not at all clear that governmental policy making is universally turning away from science. Indeed, many would argue quite the opposite, that governments use scientific debate to hide crucial political decisions behind a veil of technical discourse (e.g., Mouffe 2000). Some scientific artifacts are pounced

upon by politicians and media alike to further particular policies or interests, while others are discredited in both elite and popular circles. One might argue, as Latour (1993) does, that the brief hiatus where public scientific rationality appeared to dominate more folksy, traditional, or local knowledge (e.g., through dismissing it as superstition etc.) was a short, fragile, and exceptional period, rather than a norm, from which we are only now recovering. How widespread has the belief in science been among different social groups? Part of the difficulty of progressing this discussion lies in the broad and multiple category of science itself. As with many 'polythetic' categories, we need to specify what the content of our accusations is rather than follow populist declarations about 'Science' as a whole. While there are perhaps clearer conceptions of what constitute 'scientific methods' within distinct disciplinary traditions, science as a concept is loose, as is technology (and other general categories, including politics).

In the meantime, some recognizably scientific and technological practices remain central to contemporary politics and statecraft, so ubiquitous as to be barely reflected, while others cause consternation and conflict. It is only by examining closely the particular embodiments (or territorializations) of sciences and technologies that the relationship between the categories can be elucidated, and the power of their discourses illustrated. The starting point of this special section is that the relationship between science, technology, and politics is complex and heavily interdependent (or hybrid), and that the effort to tease out the processes of contemporary governance into scientific, technological, and political strands is an object of reflection in its own right. That is, while Kuhn long ago established that scientific paradigms are established through political social relations, our aim is to examine the way in which political processes might be routed via science and technology; in the process, though, we must examine what this suggestion implies in terms of the categories we have chosen to adopt.

Here, therefore, we examine the tensions between the categorizations of politics and science,

taking an anthropological approach toward these fields. This requires us to examine particular fields of politics and of science, to try and show how they are enmeshed, beyond the acknowledgment that scientific activity is socially situated.

In order to examine these themes, this special section presents ethnographies derived from a number of areas where technological and scientific debate are politicized: genetic modification in Norway, infrastructure siting in Sweden, chemical plant safety in the UK, gas pipeline development across the North Americas, MMR (measles, mumps, and rubella) vaccines in the US, and the 'science' of ethnography itself in South Africa. Across these studies of the politics of science run theoretical, analytical, and critical threads. In particular a question emerges about the relationship between the nation and science. What role does scientific discourse play in political debate? How do science and technology become emblematic of the nation and its governance?

Why might we be concerned about the national in an ethnographic approach to science and technology? Whatever the value of the concept of the nation, there seems little disagreement amongst critics and theorists of nationalism that it remains "the dominant socio-political condition of our age" (Banks 1996: 125). Its status as a significant political and philosophical concept is sustained by its frequent invocation on the domestic and international political stage, as well as by its continued presence in everyday communication. Zimmer offers a compelling summary of modern nationalism in the European canon, suggesting half a dozen competing accounts of the origins of nationalism, as ideology, political movement, as the historicist response to the crisis of enlightenment absolutism, as the 'cultural glue' of industrial societies, as cultural construction, or as ethno-symbolism (Zimmer 2003). Of these, it is Gellner's account of the rise of the nation as a response to the transformation from agrarian to industrial societies which has perhaps been adopted most widely within the anthropological debate (Gellner 1983). However, as Schnapper points out, the nation did not appear simply in response

to technology in a society whose aim was infinite progress; modern society was democratic, which also demanded a level of homogeneity (Schnapper 2002). Whether or not Gellner's explanation of the rise of the nation is generalizable, his arguments support our recognition of the central significance of science and technology within the institution of the nation-state. Although Zimmer opposes him to Gellner, Anderson's suggestion that nationalism was a new cognitive formation in response to the crisis of meaning in the decline of the religious and dynastic order from the sixteenth century onwards could be seen to complement Gellner's arguments (B. Anderson 1983), since both recognize the historically embedded social construction of the nation. The nation became a focal symbol of adherence and passionate sentiment, gathering around itself an array of institutions and structures that provided both political legitimacy and ethnic loyalty, grounded in imagined territorial allegiance. Within this conceptual framework, the notion of science as the core of enlightenment modernity has remained a central theme, where nation-states, in contrast to theocratic or monarchical states, frequently—if not consistently—refer to techno-scientific forms of rationality for legitimacy.

Whatever the cause of nationalism or the origins of the nation, its role as an organizing principle in the modern state is crucial. Scientific rationalities are repeatedly invoked as the basis of the modern nation-state, alongside calls to ethnic and national authenticities, even as the paradox in the meeting of these different calls to legitimacy remains unresolved. The nation provides a framework of structured relations, invoked by state agents to legitimize political interests and to justify patterned relations of dominance. Glick Schiller and Fouron point out that the rise of the nation-state was consolidated in the twentieth century through organizations like the UN, which "projects a view of the world in which each nation is located exclusively within its own separate national territory" (Glick Schiller and Fouron 2001). Despite the recent attacks on the legitimacy of the UN, the nation remains largely the unit of recognition of state relations

(even in multi-nation-states). The fact that the territoriality of these nations is crucial is paradoxically highlighted by challenges from non-territorialized national movements, such as the relatively recent Roma calls for national recognition. In the late twentieth and early twenty-first centuries, a political debate emerged over the future of nation-states, both within Europe, where the promotion of a 'Europe of the regions' suggested a subordination of nation-states to a regionalized federal state, and more broadly in the face of the increasing power of globalized corporate economic activity. Despite these 'threats' to its political supremacy, the nation remains a key cultural and political icon of our time. After all, despite the promotion of European regions, it is the European council of national ministers that arguably retains the key powers within the European Union, and international assemblies of national governments that attempt to reign in transborder corporate activities. It is, perhaps ironically, the durability of the nation that can be traced through current debates over the emergence of super states and global governance.

While the abstraction of science in its ideal forms suggests that petty local nationalisms might be irrelevant to scientific theory, it is apparent that science is both a key ingredient to modern nations, and often domesticated in the interests of nationalism in both formal and informal political arenas. These local contexts transform the meanings and practices of science as they are deterritorialized and reterritorialized. Given the necessity for national formations to interpret the world through the prism of the national in order to sustain their power, global concepts may be inimical to national formations. As Schnapper argues, "The fact that the notion of a 'community of citizens' became [in the age of nationalism] the basis of political legitimacy and the source of the societal link meant that liberal societies could not accept the idea of being governed by 'foreigners'" (2002: 3). Given the close discursive links between science and government in the modern nation-state, foreign science needs to be incorporated within the national if it is not to be perceived as a form of colonialism.

A pertinent example is offered by Katarzyna Cwiertka in her intriguing account of the introduction of 'Western' food into the Japanese market (Cwiertka 2004). According to Cwiertka, the beginning of nation-state making in Japan was marked by the first Western-style banquet held for foreign diplomats in 1871 (*ibid.*: 122). In these early days, the emperor sought to demonstrate his modernity by marking the end of Japan's isolationist policies and adopting Western styles, science, and technology. The adoption of Western clothing and food spread among the Japanese elites, and was one of the means used to construct a uniform culture of the state. However, Western food remained a foreign affectation until World War II, when increasing food crises saw the government adopting scientific solutions to food shortages and thereby increasing the reliance of the nation-state government on scientific solutions to manage the population. As food science became central to the 'total war' effort, Western dishes were adapted by adding flavors, being served with rice, and being given poetic Japanese names. Western food and food science were thereby domesticated, to the point where the notion of nutrition and Western food as imported began to fade, and the modern Japanese diet became eclectic and uniform.

It would be wrong, however, to see this as a one-way process of transformation. Not only did Japanese food styles alter, but scientific approaches developed along different lines. Cwiertka suggests that the domestication of Western food in Japan was similar to the embedding of foreign food elsewhere (*ibid.*: 135), and it appears that nutrition and food-science were also similarly embedded. The process of domestication not only reflected the rise of the nation-state, but contributed toward the definition of what it is to be part of the nation. In a Foucauldian analysis, the state used scientific methods to manage the population through the definition, control, and distribution of foods. Thus, the importance of nationalizing foreign imports extends into scientific and technological development and provides a crucial element to the construction and maintenance of the modern nation-state. In the process, also,

science is transformed by its very nationalization, territorialization, or localization.

Sahlins adopts a rather different way of interpreting the way local issues draw on nationalist arguments and vice versa. He describes the giving of collective identities to local relationships as ‘symbolic amplification’, which he illustrates with the nationalizing of disputes between persons (Sahlins 2005). Sahlins sees the amplification working in both directions, whereby local disputes are articulated through greater political and ideological differences, and such higher-level abstract entities are concretized through personal relationships. The amplification can work from personal to collective relations and beyond in what he calls structural relays between lower and higher orders of socio-cultural order. According to Sahlins, ideological or political resonances do not dissolve the original dispute, but make it more intractable (*ibid.*: 6). Might we suspect, then, that science and the nation are invoked by politicians in such a way as to symbolically amplify local disputes? To what extent does this contribute to their intractability?

Beyond our observations about the interrelations between scientific and nationalist discourses, we also ask: how do we ‘do’ the anthropology of science? From an examination of the embodiment of knowledge, inspired by Foucault’s insights into how the disciplines of self which make governance possible operate as distinctly in the governing of science and technology as they do in statecraft, we ask what is the form of our induction into technological mentalities? How do debates about technology displace moral or political arguments?

A useful place to start this investigation is to examine not the politics of scientific discourse, but the use of science as a discourse within political debates. Taking science to mean the abstract formulation of principles of thought (for the time being), it is when science becomes a taken-for-granted principle of action that it lends itself to the subtlest analysis. Science is invoked frequently in political debate, and this special section takes as its focus a series of examples of how this happens and to what effects.

Starting points

In the field of politics—particularly of the nation-state—it is hard to deny that one of the forms of science most routinely and ubiquitously invoked is that noted by Foucault as the state’s own science, statistics (Foucault [1978] 1991). The science of probability plays a central role in most contemporary governing practices and discourses, to the point where it is almost universally accepted as a legitimate way to present knowledge, even if the details of its implementation may be disputed (Hacking 1990; Murdoch and Abram 2002). Studies of risk particularly highlight the dominance of the relation between probabilities and experience, as Boholm illustrates (this volume).

Foucault’s observations on the development of a mentality of governing which relied on statistical formulations—which he called ‘governmentality’—also led Miller and Rose to the definition of modes of thought such as statistics and its derivative accounting as ‘technologies of government’, those tools which are so familiar that they fade routinely into the background of governmental practice and mostly remain outside critical analysis (Foucault [1978] 1991; Miller 1990; Miller and Rose 1993). The idea of governmental technologies helps us to notice the ways that systems of thought such as accounting, or auditing (Strathern 2000), become ways for governments to centralize their control over distant events (Law 1986), and offers new ways to conceptualize the relations between science and politics. Not least among these is the anthropological approach of questioning what the categories ‘science’ and ‘politics’ aim to distinguish. What is the purifying work of separating thoughts and actions into the disciplines of science (or technology, or techno-science) and politics? Why do these categories confer different kinds of status on knowledge, and how is that embodied in human activities? How are the worlds created by humans in their material environments classified into science, technology, and politics, and what are the effects of such a classificatory system?

Once we begin to question these forms, we can take a rather more critical approach to contemporary debates about the so-called technologization

of politics. These suggest that many political arguments are sidelined into detailed technical debates, shifting the center of power from political arenas into the realms of technical expertise or private interests. Several commentators address the spread of consumer capitalism and the seepage of power from nation-states to multinational corporations (in what may be labeled as one particular interpretation of 'globalization'). A number of transformations are reported under this rubric of globalization, including the weakening of the nation-state, the growth of multinational corporations and of super states (such as the EU), a significant weakening in the legitimacy of local politics, not least in response to the former conditions, and the growth in technical and managerial practice. In brief, the suggestion is that politics is giving way to bureaucracy, and that science and technology play some part in this. Chantal Mouffe, for example, suggests that politics is being invaded by technocracy, and political dilemmas are remaindered into moralized debates that leave no room for broad democratic practice (Mouffe 2000). Crudely put, the argument suggests that the conversion of government into management by capitalist managerial methods (or 'New Public Management')³ is siphoning political decisions into delegated bureaucratic activity. This is not the first time that the end of politics and ideology has been diagnosed. Bell and Kristol's discussion in the 1960s (Bell 1960; Kristol 1968) were echoed in John F. Kennedy's suggestion in his commencement address at Yale university in 1962 that "the problems of fiscal and monetary policies in the sixties as opposed to the kinds of problems we faced in the thirties demand subtle challenges for which technical answers, not political answers, must be provided."

If politics is replaced with technological solutions, Mouffe argues that politicians are left without recourse to political debate, since politicians are not necessarily equipped to deal with scientific or technological details. However, technical discourse does find a way into political arenas, and authority over scientific or technical argument becomes a valuable political commodity. Recent versions of this 'technological turn' in UK politics are reflected in

accusations that the Blair government tends to quantify targets of achievement rather than develop complex or rounded political visions. In the dominance of the argument over where the target should be, the greater political question about how or why it ought to be achieved is subordinated. That is, the politics of whether a particular social trajectory is in the 'interests of the nation', is subjugated into a debate over the scientific validity of particular policy elements: is the technology or science 'good' or 'bad', or can the policy's outcomes be evaluated in relation to numerical targets?

As ethnographers, we are bound to ask, (how) is this happening? By what process could political life be transformed across the globe, in many different nation-states (and within or beyond those apparently unstable formations)? What techniques are being adopted, and by whom, to strip politics of its validity?⁴ What governmental technologies are insinuating themselves into perceptions of the political? Are we sure that this is the process underway, or is politics, rather, expanding its remit to regulate additional areas of human activity?

These questions can be addressed through the examination of transformations of knowledge, in particular the translation from one (e.g., scientific, technical) forum into another (political discourse), from a debate, usually contested, occasionally a consensus, into easily understood nuggets of knowledge, or the creation of facts palatable to political consumption. What do the categories of political, moral, bureaucratic, technical suggest? How are they instrumentalized, and how do we, as anthropologists, fall within them or construct a critical stance toward them? In what follows, I examine approaches to the analysis of governing and science, and introduce the role of the national in these debates.

Approaches to the politics of science in society

Science has long been a valuable tool in the political arsenal, unsurprisingly, as it posits itself as above or beyond political ambivalence, which is

why it is supposed to carry supra-moral authority. Modernist discourses of science wish to convince us that its neutrality makes science solid as opposed to the fluidity of political vagaries. The allure of statistical methods and audits has thus rested on their ability to appear constant and non-partisan. Seen as a governmental technique rather than a technical calculus, audit therefore appears to have much in common with book-keeping, as a technique to create ordered entities out of a myriad of transactional activities. Statistics, as alluded to above, has thus become a privileged science through which to perceive, translate and govern the activities of citizens (Foucault [1978] 1991; Hacking 1986, 1990). With its ability to reduce diverse materials and knowledges to a singular, apparently universal form, statistical methodologies present an ideal tool with which to govern a complex cohort of social, technical, political, and economic fields. But statistics alone does not suffice to win political arguments: it relies on other forms of 'technical' reference to support particular decisions. The incorporation of different forms of science and technology into governmental practice thus relies on our ability to accept this process of reduction of complexity into seemingly free-standing scientific elements. Perceiving forms of science, more generally, as technologies of government has relied on the suggestion that they arouse legitimacy and respect, and thus superiority over other forms of knowledge (Miller 1990; Miller and Rose 1993).

Key to the study of science and technology in society, therefore, is the concept of the status of knowledge and the suggestion that scientific knowledge carries authority in Modern societies. Parallel to this notion is the suggestion that this authority is more fragile in postmodern societies, where the legitimacy of state agencies and establishment authorities (of which Science is supposed to be one) is no longer secure. Knowledge about science may appear risky or mystical to non-specialists or lay persons,⁵ and technologies can perform powerful political roles, particularly those most closely associated with 'post-normal' science, or science with high decision-stakes and high systems-uncertainty (see Ravetz and

Funtowicz 1998). Yet the division between science-knowledge and nature-knowledge is also problematic for scientists. Callon's description of the difficulties encountered when experiments conducted in the 'purified' surroundings of the scientific laboratory are translated back into the complexity of the natural world, suggests that putting new discoveries into practice demands a new conceptualization of 'nature' and 'science' (Callon 1986). Latour, however, aims to bring down the parallel division between science and politics, showing how large scale innovative technological projects are intricately engaged in political processes and cannot be understood in isolation as technological successes or failures (Latour 1996). His account of the failure of a project for high-tech light-rail transport in Paris shows that each step of technological innovation relied on a hybrid network of scientific, political, technological, and material actors, crucially reliant on particular actors' qualities and characteristics. Latour, thus, brings the person back into techno-science, attributing personality even to material or non-human elements, even if this apparently light-hearted device can be criticized for reifying individualism. At the very least, he demonstrates the methodological necessity of transcending disciplinary boundaries.

Latour also makes some general arguments about the notion of science, arguing that the purification of knowledge into a dichotomy between science and culture formed the basis of Modernity (Latour 1993). This Modernity has never been as complete as many have suggested, he claims, since the authority of scientific discourses in the modernist era has been somewhat exaggerated. He suggests that in rehybridizing the social and the scientific, new methodologies for studies of science and technology can be explored. Indeed, Latour's earlier ethnography detailed the construction of scientific facts, laying a foundation for an abundance of research into the relations between laboratory science and scientific policies (Callon 1986; Latour and Woolgar [1979] 1986; Law 1986). By 'following the actor', rather than limiting ourselves by disciplinary approaches, Latour argued that we are able to trace the networks that consolidate or

collapse the transformation of an idea or discovery into practice. This can be understood as an appeal to students of science to adopt a more ethnographic approach. Latour has argued as vehemently for the importance of studying social actors in material networks as for including material elements in social networks, or rather, not to see these as separate at all. His approach, however, also defied normative (although not substantive; see also e.g., Caglar 1997) anthropological tendencies to work within community boundaries (of whatever sort), favoring a methodological blindness to the status of material/non-material actors, and a tracing of network relations rather than bounded community relations. In this, one could argue that Latour was pre-empting the post-colonial critique of situated ethnography (Gupta and Ferguson 1992, 1997; Olwig and Hastrup 1997).

Latour's approaches have much to offer us in our investigation of the role of science in politics. While we may acknowledge that much of his particular project has been to make anthropological methods accessible to students of science, and science studies to anthropologists (rather than criticizing anthropology *per se*), his approach to networks which incorporate both the human and the non-human has been criticized by anthropologists on two main accounts. Firstly, as Skodbo suggests (this volume) the actor-networks of actor network theory (ANT)⁶ are peopled by self-interested individuals with ambitious strategies, and these take no account of the complexity of human relations, least of all the affective relations which scientists have with science. Secondly, Strathern criticizes the ANT approach for its suggestion of limitlessness, i.e., that networks can be followed indefinitely. Networks of human-nonhuman actors would appear to have nodes, but no boundaries, such that links might be followed to infinity. However, Strathern argues that networks must be bounded in some way. Unbounded networks would provide no basis for analysis as "interpretation must hold objects of reflection stable long enough to be of use" (Strathern 1996: 522). On the contrary, networks are cut at significant points, both conceptually and practically.

Among the many examples Strathern offers for the way networks are cut, the 'prospect of ownership' is key. Strathern considers the world of genomic invention, which may appear to have the character of unlimited human-material-nonmaterial networks. In practice, though, once laboratory groups have made a discovery that is commercially exploitable, they apply for a patent, thereby creating a hybrid with commerce. This new hybrid entity, the patent, merging the scientific and commercial worlds, limits the ability of other scientists to exploit the same genomic invention. Hence, the patent cuts across heterogeneous scientific research networks, introducing the world of commerce, and creating a hybrid that 'cuts' the network and stops network expansion. To be fair, Latour, in retrospect, suggests that the notion of rhizomes favored by Deleuze and Guattari may be a better metaphor than the network, now dominated by the apparently unstructured image of the World Wide Web (Law and Hassard 1999). He also identifies the proliferation of hybrids as an outcome of the purification through classificatory processes of complex worlds (the distillation of pure forms demands a re-engagement with other pure forms, through hybridity—in order to re-engage with the pre-distillation complexity). For Strathern, such hybridity is uneven; heterogeneity and homogeneity are co-existent in human-nonhuman forms.

If we expand Strathern's example of the commercialization of scientific networks as a point at which networks are cut or limited, then we may also perceive the translation of 'folk' and political knowledge, for example, as cutting points. One could argue that very many scientific discoveries and technological inventions are recognized only through the process of hybridizing scientific networks with others, such as media, political, or folkloric realms. Here, hybridizing suggests the opposite of the purification that allows science to be considered as separate. The point at which scientific or technological development becomes an invention, for example, might itself be considered as the cut in a network, as Strathern suggests, dividing those who belong to the invention's authors from those

who do not. Hence Strathern's suggestion that the rights to dividends from invention, which she identifies as the ultimate hybrid (culture added to nature), are limited when a patent is established (Strathern 1996). Given that major scientific discoveries are inevitably not the result of the isolated actions of individuals, as they rely on a network of specialists and developers to recognize their import, it is perhaps appropriate to raise the question of which kinds of networks are being cut.⁷ We might examine the trajectories of knowledge, e.g., from local to scientific to technological and commercial, to trace the points at which the potential for certain inventions is truncated in favor of others, and thereby account for the popularity of certain technological forms over others. We might also trace the trajectories of scientific discourses to see which become powerful and which fade, as indeed Lang does in this special section. In the present discussion, however, we must add back in the element of politics and government. If governments aim to regulate scientific activities or technological processes, they must find a way to bridge the gap between science-politics and government-politics. Perhaps it is the creation of a rehybridized science-politics we should be examining rather than asking whether science is politics by other means.

What neither of the above approaches stresses is precisely a critique related to the transformations that happen when networks meet nationalism or national boundaries. Whereas the networks described include hybrids defined epistemologically, the flow of ideas across national boundaries is less emphasized. However, one might argue that such boundaries provide a significant and unique form of hiatus in any network, where, by definition, meanings alter with the transition. After at least a decade of intense—yet ultimately unsatisfactory—debate under the rubric of 'globalization', a reconceptualization into 'transnational flows' redefines the question of increasing speeds and ranges of 'global reach' (Eriksen 2003; Inda and Rosaldo 2002). Rather than define globalization as the spreading of 'Western' consumer capitalism and its attendant cultural traits, a focus on the flows

of knowledge, material, exchanges, and the like, allows multi-directional flows to become apparent (W. Anderson 2002). By putting aside the glosses incumbent in the all-encompassing term 'globalization', we can begin to admit that the patterns of flows have altered in distinct ways through the twentieth and the twenty-first centuries. Flows across national boundaries, therefore, offer a particular purification of form that requires rehybridization, which becomes apparent through a study of the transformations that occur. A flow of knowledge or material (or, indeed, people) across a national boundary may be associated with a change in status, such as from scientific to social or commercial. The border crossing of knowledge may also coincide—or not—with entrance into a different juridical or state regime. In Strathern's terms, the meaning of substances can change as they are displaced in geographical as well as disciplinary space (1996). If technologies are conceptualized as hybrids of culture and nature, then we can explore the negotiation of meaning that occurs as technologies as well as substances are displaced. Hence, adding international transfer into this *mêlée* of flows creates a site of potentially radical and unpredictable transformations.

Although a certain amount of political science literature assumes relatively unproblematically that political knowledge—such as policy—is learned and transferred (Rose 2002), recent studies re-assess the meaning of such knowledge transfer and recognize the complexity involved in any such form of 'translation'. There are a number of questions about knowledge-transfer between governments which have been usefully studied, such as why certain policies take on an appearance of 'success' and attract international attention in policy circles despite locally acknowledged flaws (Carlen 2001), just how much policies resemble one another when they are adopted by different governments, and what the routes of policy flow are (Gilbert 2002, 2004). A recent research program sponsored by the British Economic and Social Research Council found overwhelmingly that policy—whether related to science, economics, imprisonment, environment, or other areas—was very rarely simply

‘transferred’ from one government to another.⁸ In the rather sketchy process of ‘policy learning’, small nuggets of policy jargon find their way between policy institutions, through personal experience, professional literature, media attention, or educational institutions. While this might not be overwhelmingly surprising for anthropologists, it reinforces the necessity of examining very carefully assertions of universal knowledge flows. It further suggests that nationalization of international discourses is essential not only to implement shared policies, but to bring abstract discourse back into meaningful context in any particular political location.

An awareness of the flows of knowledge allows us to bring the discourse of the nation back into the discussion of globalization and networks. The merits or otherwise of this activity are not central to our discussion here, but what is, is the acknowledgment that the nation-state is still being promoted energetically in many contexts, not least through the domestication of what would otherwise appear to be supra-national discourses including science. If scientific fact is promoted as having an existence independent of the persons involved in its ‘discovery’ or ‘invention’, then it purports to be situated geographically and conceptually above the political divisions between nations and states. This supra-national status of science is apparent in meta-scientific discourse. Boholm has reviewed the literature on risk research over twenty years, and points to the ways in which discourses of ‘social, subjective’ versus ‘scientific, objective’ risk and danger have been juxtaposed (Boholm 1998, 2003). She argues that this dichotomy suggests that scientific knowledge is still afforded a universalizing status that does not accord with its historically situated and socially embedded character,⁹ and that it further, still, tends to undermine the legitimacy of indigenous knowledge (see Sillitoe 2000). In other words, she once again acknowledges the colonializing tendencies of scientific philosophies. What is clear from the articles in this special section, however, is that science must often be domesticated in order to be politically useful, and that this presents a radical dilemma that undermines the

legitimacy of scientific evidence and knowledge as ‘above politics’.

However, if one of the weaknesses of the study of science is a tendency to relegate local specificity to the status of ‘case study’, one of the strengths of anthropology lies in its ability to tie international discourses down to particular historiographies. The ethnographic detail of how science and technology are repeatedly dragged back into the domain of the local can still usefully be made explicit. One clear example can be found in the attempts by Chinese politicians to define scientific knowledge about homosexuality as ‘foreign’, and in activists’ counter-attempts to define it as Chinese and therefore applicable to the debate on the public acceptability of homosexuality in China (Boermel 1999, 2003).

This indication of the necessity of nationalizing science is also found in less overtly political form. In her study of Finnish forest activism, Berglund reveals how the creation of a national science became a pillar of a sense of Finnishness, noting that Finnish forest science “emerged as a body of knowledge of global significance” to the extent that it has become “an export item” (Berglund 2002: 87). While Berglund is more concerned to assess the meaning of forest science within Finland, rather than what happens to Finnish forest science once it embarks on its export trajectory, she problematizes the ambivalent centrality of forest science to Finnish environmentalism, making visible the “decades of hard work” which effectively designated “some forests as raw material for industry and others as monuments to Finnish national heritage” (ibid.: 94). That is, she highlights “how much political power is needed to purify the domain of the technical ... from the ‘merely’ social and political” (ibid.: 93). One might, indeed, argue that this is the definition of science/technology; that its self-definition is to transcend the political. Yet it cannot achieve transcendence, since to be in the world is to engage with the political. However, as Berglund notes, “a scientific claim about nature is at its strongest when the scientist(s) who created and authorized the claim act as if the facts spoke for themselves” (ibid.: 94), and it is this invisibility which makes

scientific discourse powerful as a political tool. Even so, as Ponte shows (this volume), the power of scientific arguments can in turn become remarkably vulnerable when placed in an anti-intellectual political sphere, perhaps confirming that the commitment to modernist principles is less than complete. Although we simplify our assertions by referring to a 'Euro-American' modernist cosmology, this can still appear a minority interest even in the heart of the US. As usual, once we scratch the surface of ideological certainties, we are faced with the complexity of uneven heterogeneities.

One of the few anthropologists to have offered us a way of bringing together the problem of human-nonhuman and science-politics dichotomies is Alfred Gell. In his theory of *Art and agency*, Gell (1998) shows that works of art, in particular, have to be treated, in the context of an *anthropological* theory, as person-like; that is, sources of, and targets for, social agency. In his elaboration of a theory of art indexes, Gell suggests that the agency of actors may rub off, so to speak, onto the material objects that they manipulate. He offers the example of a soldier, a man with a gun: "[T]he soldier's weapons are parts of him which make him what he is" (ibid.: 20–21). That is, the artifact—the weapon—becomes an index between the soldier's social identity and agency. Similarly, land mines, he notes, are not primary agents who initiate happenings through acts of will but "objective embodiments of the *power or capacity to will their use*" (ibid.: 21; italics in the original). Gell specifies 'art-like situations' as "those in which the material 'index' (the visible, physical 'thing') permits a particular cognitive operation which I identify as the *abduction of agency*" (ibid.: 13). He uses abduction to "set bounds to linguistic semiosis proper" (ibid.: 15), so as not to draw semiotic parallels with language which would be misleading. Abduction, on the other hand, is an inferential scheme brought to indexical signs, such that indexes become "*the outcome, and/or the instrument of, social agency*" (ibid.). The object, therefore, can be an index of social agency as well as the outcome of social agency, but may also operate on several layers of index

relations simultaneously, hence the complexity of Gell's diagrammatic explanations of indexes and agency. Gell's approach thus avoids Strathern's critique of the nebulous unboundedness of Latour's actor-networks, yet allows us to broach the human-nonhuman divide. Whether it allows us to avoid the purifying work of social-technical or structure-agency categories as categorically as Latour intended depends on its potential to bypass the actor-agency dichotomy.

The art index can clearly be applied to other material items, as well as potentially to people and is thus applicable to our study of elements of science or technology. While Latour might argue that this is an attempt to transform the technical back into the social, we could see that it is also a way to help us integrate technology into social relations as indexes of social agency. The soldier-with-gun as a cyborg, in Haraway's terms (1997), enables us to avoid prioritizing either the material or the social by seeing them instead within the same frame.

What does this then tell us about what appear to be political debates about the applications or regulations of science and technology? Firstly, Gell's theory of art indexes, when applied to science, allows us to acknowledge the affective investment that human actors make into techno-scientific developments. As Skodbo shows (this volume), science and technology *matter* deeply to many, if not all of the actors described in the articles here, either as a set of beliefs—in the methodologies or the objects of science and technology (e.g., as 'progress')—or as a means to achieve a particular set of outcomes. Indeed, it may be a case of 'intellectual love' (Rowland 2005), a devotion to the intellectual pursuit of scientific practice. Latour, in fact, acknowledged the role of love in his ethnography of the failed Aramis technological project, which has the subtitle *The love of technology* (Latour 1996). Belief in science and technology is not often debated in political arenas as a case of for or against. Often all participants will 'believe in' the value of science as a resource, but interpret its significance differently.¹⁰ Ponte demonstrates how the status of claims linking childhood vaccination to autism were debated

in the US House of Representatives in terms of familiar American modes of expression and political-scientific discourse, following well-established methods of recruiting sympathetic supporters. The debate was effectively split between those who view epidemiological research and its statistical outputs as a true reflection of reality, and those whose faith lies in lived experience. Thus, a nationalist interpretation of empirical science, with roots in American Protestantism, came into conflict with, and dominated, a more decentralized version of science derived from European intellectualism. In other words, an affective response overrode the classic rationalist ('Modern') argument, even though both arguments presented themselves as scientific.

Secondly, Gell's theory of indexes and fields offers us the opportunity to examine the technologies put forward to political debate as indexes of a particular intention from one set of actors (e.g., the fruits of scientific research and commercialization) thrust into an unfamiliar terrain (political discourse) where they become the indexes of quite a different set of intentions. Among the latter intentions may be the construction of nationhood. Thus, the genetically modified elements used in the production of animal feeds do, or do not, seem to satisfy the Norwegian-ness of the precautionary principles for scientific development (Skodbo this volume). Technologies that satisfied a particular network, around which an array of satisfied actors/actants have coalesced, do not necessarily attract the same sorts of satisfactions as the focus (or the tangent) of a different set of relations. Gell's notion of the index with both symbolic and causal effects may be useful as a parallel to the more semiological approach to 'cultural' symbols. Layton's criticism that Gell overplays the indexical qualities of art (pictures of landmines do not maim people, landmines do) suggests that the index is more suited to analysis of science, since scientific objects may more fully incorporate the three roles of index, icon, and symbol, having a wider range of causal actions available to them than art objects (see Layton 2003). As technologies move between networks, their index is remolded, so to speak, becoming detangled from

the context within which it is safely ensconced, to be destabilized as it meets a new environment. One might argue that their 'indexness' is weakened or lost, as they become more symbolic, but they may equally adopt a new indexical power over different actants. The successful index is thus the multivalent index that can coalesce a socio-technical-political network in its favor in any particular constellation of actants, at which point it becomes unremarkable.

Flexible indexes make unreliable political allies however. The 'experts' who promote market analysis with which to evaluate the future for Alaskan gas export are, thus, seized on by the governor of Alaska as an index with which to win a political triumph, but the fluidity of their expert knowledge (its dependence on changing conditions), their very independence, makes the index a disloyal ally for the politicians trying to bring it into a more socially defined way of working (Mason this volume). The social ties between the politicians and the technicians count for less than the governor might have wished. Had the experts tied themselves into the governor's project and not retained their allegiance to the market analysis, the salability of the consultants' expertise may have suffered in other markets. Here, a scientific methodology was not successfully co-opted into a national project, and this made it ultimately worthless in political terms when the attempts to co-opt began, themselves, to symbolize a failure of political legitimacy.

Disaggregating science-travel

So far, I have discussed sciences and technologies rather loosely, interchangeably even, but it is clear that some 'kinds' of science or technology travel better than others, or at least that different kinds cross different kinds of borders. If we are prepared to accept that statistics is a science of the state, it is clear that it has been so widely adopted that it has become almost invisible in its ubiquity, its taken-for-granted legitimacy, in many countries, such that it is probably the nearest one might find to a globalized science. Of course, no

anthropologist would subscribe to the idea that statistics has a universal applicability, yet what government does not base much of its policy on references to statistical information, systems of probability, or statistically informed surveys (Hacking 1990), perhaps even with added vigor given the current spread of Geographical Information Systems as a governmental technology? Yet can this sort of science be seen to act in the same way as epidemiology, whose role in colonial activity has been highlighted (Flikke 2001, 2003)? And ought we to distinguish between those which become governmental technologies and those which do not? What is the transferability of technologies, as opposed to theoretical or practical sciences? Can we differentiate local and universalized sciences?

The danger with any such approach would be of falling back on old dichotomies between universal types of science and localized forms of technology. Indeed, any attempt to indicate which sciences travel most effectively tends toward the universalizing discourses of science itself. Instead, the examination of how similar scientific discourses are localized may be a more appropriate project, countering the careless generalizations of popular representations of globalization. This particular anthropological strategy has been very usefully applied to studies of former globalization 'scars'; the notion that television was flattening out cultural difference, for example, has been effectively dismissed through careful study of localized television-watching practices, showing us that even the same television broadcast is not received uniformly, and simultaneously challenging the notion of 'culture' itself (Abu-Lughod 1995, 1997).

By bringing together varied examples of the use of techno-science, it is possible to explore the nuances of difference. It then becomes impossible to spin a general rule of science in political practice as powerful or dominant, even if it is ubiquitous. While Ponte points to the ineffectiveness of statistical 'fact' to persuade in the US House of Representatives, where folksiness and faith are more plausible values,¹¹ 'ethnographic science' is still a powerful medium for cultural politics in South Africa, even since the demise

of apartheid, as Lang documents (this volume). Despite the horror with which most readers of this special section might react to the form of ethnography practiced by the nationalist practitioners Lang describes, their success in promoting racist notions of separate nations has been a key tool in the creation and maintenance of nationalist policies. It is specifically ethnography's supposed scientific status that affords it this role, and that is investigated in Lang's paper. What Lang shows is how a particular 'scientific' discourse is normalized through state-level political configurations, and how it survives a period of destabilization. The decades of hard work in normalizing this particular form of science are key here, as Berglund has suggested, and it is the revised hybrid actor-network analysis that offers us a way to rethink this process.

Boholm also demonstrates how a particular triangulation of technology, economy, and environment can be destabilized and restabilized, and at what point the political relevance of the national can become significant (this volume). As she points out, the earlier notion that a new rail link would improve communications within Sweden and between it and 'the continent', served to justify a mammoth investment in seductive technology. However, when ecological disaster struck (through the use of a particular French sub-contractor), these arguments had to be radically reconstructed. That the area worst affected by technological failure was one emblematic of Swedish rurality turned a localized disaster into a national crisis, also because it undermined the self-image of Sweden as an ecologically responsible country (Boholm 2000). What Boholm demonstrates is the fluctuating validity of scientific and technological discursive components, or 'moments' in the language of Laclau and Mouffe which Boholm adopts, within the context of rapidly developing national debates. Here, furthermore, these moments were 'tested' through a series of legal cases, both nationally and at the EU level, where the 'national interest' was specifically in question (Heiefort 2004). Political conflict over the appropriate use of state funds was effectively diverted to international courts when local political opposition was frustrated. The use

of law courts to evaluate 'national interest' brings the process into a more complex field of competing actors and institutions. It also forces us to reassess our definition of 'indigenous' knowledge, when so-called ordinary citizens shape-shift into international players of a highly contentious, large-scale, and sophisticated technical game. And here, again, the vehemence of the affective commitment to ecological form must not be overlooked, both for the project-technologists and the protest-technologists.

It is instructive, then, to contrast this episode with the similarly large-scale developments considered by Schlüter and Phillimore (this volume), on Grangemouth, the largest concentration of chemical industry in Scotland and a major economic factor in the national perspective. The definition of Grangemouth's future becomes a contest between economic and environmental definitions of quality of life, defined in the context of local and national priorities. The meaning and hierarchical position of 'environment' becomes crucial in determining how the land is regulated, despite the wide acceptance of technological risk associated with employment within the town. The risk assessments used to block locally desired developments rather than 'risk' itself appears to be 'the problem'. The status of risk is transformed into a contest between local specificity and history (of large-scale industrial technology), and regional and national ambitions (to define Grangemouth's role). In this instance, it is the national agencies and regional developers who threaten to control the town's utility and character, despite local commitment to technology and industrial employment. Dirt and danger are qualities of Grangemouth that are attributed to it by actors from outside the town, however, since within Grangemouth, technology is known and related expertise is a source of pride. Present danger is associated with a failure by BP, the established employer, to maintain safety procedures in the face of economic stringency. More significantly, though, risk and resentment are aimed at new players in the field with 'no history' in the town, who are therefore not bound into imagined and idealized forms of reciprocity and obligation. Their technology has

not been tamed by the socialization of industrial relations, and this illustrates the extent to which generalized discourses of science and technology must always be grounded in local relations. However, the argument in this location seeps into the general and global, and the sense of place becomes isolated from the nation building currently underway under the new Scottish parliament. Industry, in this location, is a national asset, yet the tension with national environmental regulation is felt locally, not nationally.

Conclusion

In approaching science, technology, and politics, this article aims to bring together a set of disciplinary categories and explore the potential of new theoretical perspectives that emerge. The common ground between apparently disparate developments such as imagined Alaskan oil pipes, railway tunnels, and Genetically Modified food policy is found in the need for an analytical range incorporating studies of science and technologies of government, with an awareness of the significance of national projects. Using forms of actant-network analysis can help us to understand how some instances of science become not only acceptable but also potentially ubiquitous and beyond the general scope of awareness. Reference to studies of policy learning can indicate the flows of particular types of scientific discourse and governmental technology. Bringing attention to the national in the study of science also helps us to see how politics requires science to be nationalized in some arenas. It also enables us to begin asking whether there are kinds of science that do or do not transfer effectively across national boundaries. As a form of post-colonial science studies, it opens a range of questions about the government of science as well as the science of government. How does politics require national sciences in some arenas? Can we make statements about the kinds of sciences which do and which do not 'work' in political arenas? Is statistics the state's own science to the extent that it need not be brought within the nation? Are there national approaches to using statistics? Is it

a special case or are there others? Does this help us formalize our understanding of the simultaneous power and lack of legitimacy in science in different contexts?

Taken as a whole, the articles in this special section of *Focaal* recast notions of nation, politics, government, science, and technology, assessing the potential of theoretical approaches drawn from studies of science for anthropological analysis. One of the outcomes is a clearer appreciation of the seductive attraction of science, its affective fascination, and its potential to change the nature of political debate, both to transform it into technical detail and to transmute it into a narrower moralistic competition. If science and technology discourses are, in fact, diverting political arguments into moral ones, the articles in this section trace the spaces where those arguments are embodied, through courts of law, parliaments, media, and so forth. But they also problematize the assumption that that process is one-way. Clearly, science is resistible and malleable, and we should not overstate the power of scientific discourse. It is here, seeing scientific and technological practices and discourses through the political realm, that the significance of the nation begins to re-emerge, regrounding the abstractions of science and technology. Despite its ambitions, we are more than ever aware that knowledge is not freestanding, but must be contextualized to be instrumentalized—science becomes a governmental technology through the imperfect process of implementation, and this process is often regulated through national-level government and its associated political institutions.

Acknowledgments

Thanks are due to the organizers of the Association of Social Anthropologists 2003 decennial conference for their invitation to hold this workshop, and to all the workshop participants for their contributions. I should also like to thank Eeva Berglund, Åsa Boholm, Peter Phillimore, and Achim Schlüter, and anonymous referees for their valuable comments on earlier drafts of this article.

Simone Abram has a DPhil from Oxford (1994) and has been a lecturer at Sheffield University in the Faculty of Architectural Studies since 2000. Publications include *Rationalities of planning* (2002), *Anthropological perspectives on local development* (1998), and *Tourists and tourism* (1997). She is currently producing a documentary film about urban regeneration.

E-mail: s.abram@sheffield.ac.uk

Notes

1. This special section of *Focaal* emerges from a workshop held at the Association of Social Anthropologists decennial conference, 'Anthropology and Science', in Manchester in 2003. The workshop invited participants to consider the use of science and technology as 'politics by other means', and the notion of 'siting controversy' was suggested as a possible theme. Participants were also asked to address a common literature, referring in particular to Latour, Strathern, and Gell. In fact, the papers addressed a gratifyingly wide range of themes and brought quite different approaches to the literature. The workshop was arranged in a discursive mode. That is, participants were given only about fifteen minutes to assert the key elements of their argument, and then a significant amount of time was given over to discussion. This format allowed us to achieve something that is often aimed for but seldom achieved, namely, the emergence of a new set of themes from the interaction between the papers presented. Whilst each individual paper addressed the use of science or technology in a particular political debate, when they were presented together it became increasingly obvious that in each case the particular form of science in question was being domesticated, most notably in terms of a discourse of the nation. This theme is considered here with reference to the literature of science and anthropology, in order to explore the forms of domestication of science and technology into forms of state.
2. Longino suggests that it is "nonsense to assert the value-freedom of natural science. Scientific practice is governed by norms and values generated from an understanding of the goals of

scientific enquiry,” themselves the “production of explanations of the natural world” (Longino 1990: 4). She refers, in turn, to Haraway’s argument that science is a series of political discourses, situated in local gendered contexts.

3. See Ferlie (1996); McLaughlin, Osborne, and Ferlie (2002); and Stoker (1999) for a discussion of definitions of New Public Management.
4. One might of course take a rather different approach and ask how politics sustained its remarkable centrality for so long in the face of constant challenges, but that is not a project for this article.
5. Lay persons being science’s definition of non-scientists. It is important not to make the common governmental mistake of assuming that ‘publics’ are necessarily ‘lay’ (Abram 2004).
6. ANT, actor network theory, is a common term for a nexus of ideas about science and society (Law and Hassard 1999)
7. See Kuhn (1962). Classically, penicillin’s significance was minimal until its mass manufacture was made possible. Hence, Fleming’s fame as ‘discoverer’ relies almost completely on the technical work of Heatley, Florey, Chain, and Moyer (Lax 2004).
8. For more information on this research program, see <http://www.hull.ac.uk/futgov/>.
9. Wynne (2003) also suggests that the suggestion that merely explaining science will help to legitimate scientists as powerful actors is in itself an underlying cause of public alienation from science.
10. Space prohibits the exploration of parallels with theology.
11. Jonathan Raban also indicates the importance of theology in political discourse in the US (Raban 2004).

References

- Abram, Simone. 2004. The smell of money: minor risks and olfactory sensibilities (the anatomy of a protest). In *Facility siting: risk, power and identity in land use planning*, ed. Åsa Boholm and Ragnar E. Löfstedt, 72–88. London: Earthscan.
- Abu-Lughod, Lila. 1995. The objects of soap opera: Egyptian television and the cultural politics of modernity. In *Worlds apart: modernity through the prism of the local*, ed. Daniel Miller, 190–210. London and New York: Routledge.
- _____. 1997. The interpretation of culture(s) after television. *Representations* 59 (Summer): 109–34.
- Anderson, Benedict. 1983. *Imagined communities: reflections on the origin and spread of nationalism*. London: Verso.
- Anderson, Warwick. 2002. Postcolonial technoscience. *Social Studies of Science* 32 (5/6): 643–58.
- Banks, Marcus. 1996. *Ethnicity: anthropological constructions*. London: Routledge.
- Bell, Daniel. 1960. *The end of ideology: on the exhaustion of political ideas in the fifties*. Glencoe, IL: Free Press.
- Berglund, Eva. 2002. Expertise and counter-expertise: science in Finnish forest activism. *Focaal* 40: 83–102.
- Boermel, Anna. 1999. *Male homosexuality in contemporary mainland China*. Oxford: Oxford University Press.
- _____. 2003. *Knowledge, truth and power: foreign science in official and academic discourses about homosexuality in reform-socialist China*. Manchester: University of Manchester.
- Boholm, Åsa. 1998. Comparative studies of risk perception: a review of twenty years of research. *Journal of Risk Research* 1 (2): 135–64.
- _____. 2000. National objectives – local objections: railroad modernization in Sweden. Göteborg: Center for Public Sector Research (Centrum för forskning om offentlig sektor/CEFOS) Univ. Göteborg.
- _____. 2003. The cultural nature of risk: can there be an anthropology of uncertainty? *Ethnos* 69 (2): 159–78.
- Caglar, Ayse S. 1997. Hyphenated identities and the limits of culture. In *The politics of multiculturalism in the new Europe*, ed. Pnina Werbner and Tariq Modood, 169–85. London: Zed.
- Callon, Michel. 1986. Some elements of a sociology of translation: domestication of the scallops and the fishermen of St. Brieuc bay. In *Power, action and belief: a new sociology of knowledge?* ed. John Law, 196–233. London and Boston: Routledge and Kegan Paul.
- Carlen, Pat. 2001. Controlling measures: the repackaging of common-sense opposition to women’s imprisonment in England and Canada. In *Criminal justice and political cultures*, ed. Tim Newburn and Richard Sparks, 104–22. Cullompton, UK: Willan Publishing.
- Cwierotka, Katarzyna J. 2004. Western food and the making of the Japanese nation-state. In *The politics of food*, ed. Marianne E. Lien, 121–39. Oxford: Berg.

- Eriksen, Thomas Hylland. 2003. *Globalization: studies in anthropology*. London: Pluto Press.
- Ferlie, Ewan. 1996. *The new public management in action*. Oxford: Oxford University Press.
- Flikke, Rune. 2001. *Curing the ills of history: from colonial public health to hygiene and healing in contemporary South African independent churches*. Oslo: Department of Social Anthropology, University of Oslo.
- _____. 2003. Offentlig helse som rasisme: epidemier og biopolitikk i Sør-Afrika. *Norsk Antropologisk Tidsskrift* 14 (2–3): 70–83.
- Foucault, Michel. [1978] 1991. Governmentality. In *The Foucault effect: studies in governmentality*, ed. Graham Burchell, Colin Gordon, and Peter Miller, 87–104. London: Harvester Wheatsheaf.
- Gell, Alfred. 1998. *Art and agency: an anthropological theory*. Oxford: Clarendon Press.
- Gellner, Ernest. 1983. *Nations and nationalism*. Oxford: Basil Blackwell.
- Gilbert, Alan. 2002. 'Scan globally; reinvent locally': reflecting on the origins of South Africa's capital housing subsidy policy. *Urban Studies* 39 (10): 1911–34.
- _____. 2004. Helping the poor through housing subsidies: lessons from Chile, Colombia and South Africa. *Habitat International* 28 (1): 13–40.
- Glick Schiller, Nina, and George E. Fouron. 2001. Long-distance nationalism defined. In *The anthropology of politics: a reader in ethnography, theory and critique*, ed. Joan Vincent, 356–65. Oxford: Blackwell.
- Gupta, Akhil, and James Ferguson. 1992. Beyond "culture": space, identity, and the politics of difference. *Cultural Anthropology* 7: 6–23.
- _____. 1997. *Anthropological locations: boundaries and grounds of a field science*. Berkeley and London: University of California Press.
- Hacking, Ian. 1986. Making up people. In *Reconstructing individualism: autonomy, individuality and the self in Western thought*, ed. Thomas C. Heller, Morton Sosna, and David E. Wellberry, 222–36. Stanford, CA: Stanford University Press.
- _____. 1990. *The taming of chance*. Cambridge: Cambridge University Press.
- Haraway, Donna J. 1997. *Modest-witness@second-millennium FemaleMan meets onco mouse: feminism and technoscience*. New York and London: Routledge.
- Heiefort, Ralph. 2004. When complexity becomes a problem: 'law' and 'fairness' on separate tracks in Sweden. In *Facility siting: risk, power and identity in land use planning*, ed. Åsa Boholm and Ragnar E. Löfstedt, 177–88. London: Earthscan.
- Inda, Jonathan Xavier, and Renato Rosaldo. 2002. *The anthropology of globalization: a reader*. Malden, MA: Blackwell.
- Kristol, Irving. 1968. Keeping up with ourselves. In *The end of ideology debate*, ed. Chaim I. Waxman. New York: Funk and Wagnalls. <http://www.writing.upenn.edu/~afilreis/50s/kristol-endofi.html>.
- Kuhn, Thomas S. 1962. *The structure of scientific revolutions*. Chicago: University of Chicago Press.
- Latour, Bruno, and Steve Woolgar. [1979] 1986. *Laboratory life: the construction of scientific facts*. Princeton, NJ: Princeton University Press.
- Latour, Bruno. 1993. *We have never been modern*. New York: Harvester Wheatsheaf.
- _____. 1996. *Aramis, or the love of technology*. Cambridge, MA: Harvard University Press.
- Law, John. 1986. On the methods of long-distance control: vessels, navigation and the Portuguese route to India. In *Power, action and belief: a new sociology of knowledge?* ed. John Law, 234–63. London and Boston: Routledge and Kegan Paul.
- Law, John, and John Hassard. 1999. *Actor network theory and after*. Oxford: Blackwell.
- Lax, Eric. 2004. *The mould in Dr. Florey's coat: the remarkable true story of the penicillin miracle*. London: Little Brown.
- Layton, Robert. 2003. Art and agency: a reassessment. *Journal of the Royal Anthropological Institute* 9 (3): 447–64.
- Longino, Helen E. 1990. *Science as social knowledge: values and objectivity in scientific inquiry*. Princeton: Princeton University Press.
- McLaughlin, Kate, Stephen P. Osborne, and Ewan Ferlie. 2002. *New public management: current trends and future prospects*. London: Routledge.
- Miller, Peter. 1990. On the interrelations between accounting and the state. *Accounting, Organizations and Society* 15 (4): 315–38.
- Miller, Peter, and Nikolas Rose. 1993. Governing economic life. In *Foucault's new domains*, ed. Mike Gane and Terry Johnson, 75–105. London: Routledge.
- Mouffe, Chantal. 2000. *The democratic paradox*. London: Verso.
- Murdoch, Jonathan, and Simone Abram. 2002. *Rationalities of planning*. London: Ashgate.
- Olwig, Karen Fog, and Kirsten Hastrup. 1997. *Siting culture: the shifting anthropological object*. London: Routledge.

- Ravetz, Jerry, and Silvio Funtowicz. 1998. Commentary. *Journal of Risk Research* 1 (1): 45–48.
- Raban, Jonathan. 2004. Pastor Bush. *Guardian*, London. <http://www.guardian.co.uk/g2/story/0,,1320762,00.html>.
- Rose, Richard. 2002. *Ten steps in learning lessons from abroad*. San Domenico: European University Institute.
- Rowland, Stephen. 2005. Intellectual love and the link between teaching and research. In *Reshaping universities*, ed. Ronald Barnett, 92–102. Milton Keynes, UK: Open University Press.
- Sahlins, Marshall. 2005. Structural work: how micro-histories become macrohistories and vice versa. *Anthropological Theory* 5 (1): 5–30.
- Schnapper, Dominique. 2002. Citizenship and national identity in Europe. *Nations and Nationalism* 8 (1): 1–14.
- Sillitoe, Paul. 2000. Indigenous knowledge, science and the ‘poorest of the poor’. *Anthropology Today* 16 (6): 3–7.
- Stoker, Gerry. 1999. *The new management of British local governance*. Basingstoke: Macmillan.
- Strathern, Marilyn. 1996. Cutting the network. *Journal of the Royal Anthropological Institute* 2 (3): 517–35.
- . 2000. *Audit cultures: anthropological studies in accountability, ethics, and the academy*. London: Routledge.
- Wynne, Brian. 2003. Seasick on the third wave? Subverting the hegemony or propositionalism: response to Collins and Evans (2002). *Social Studies of Science* 33 (3): 401–18.
- Zimmer, Oliver. 2003. *Nationalism in Europe, 1890–1940*. Basingstoke: Palgrave Macmillan.