

Public as Threats? Integrating Science and Technology Studies (STS) and Social Movement Studies (SMS)

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Abstract

When government and industry elites respond to or anticipate public acceptance issues having to do with industrial innovation, they construct models of the public that have variously been described as imaginaries, discourses, and frames. Because publics are sometimes mobilized in opposition to new technologies, opportunities emerge for bridging science and technology studies and social movement studies. Methodological and conceptual challenges for such syntheses are discussed. First, it is important to disaggregate categories of the public, industrial and political elites, and imaginaries (e.g., as threats, sources of innovation, or legitimate concerns). One solution is to use flexible typologies of the relations, such as industrial opposition movements, justice movements, alternative industrial movements, and regime preservation movements. Second, there is sometimes a tendency for the cultural analysis of imaginaries or discourses to utilize all-encompassing cultural logics and culturalism and to reject nomothetic inquiry, and alternatives are discussed.

Many modern states are deeply committed to industrial innovation because it is necessary for a strong military defense and for the economic health of the domestic economy. There is frequently a consensus among political and industrial elites in favor of the benefits of new projects of technological and industrial development. However, these projects can provoke public opposition, especially when they involve new technologies that pose potential risks and uncertainties with respect to privacy, environmental well-being, occupational safety, public health, and other values associated with the "public interest." Thus, a situation emerges in which states and industrial regimes must respond to or even anticipate public opposition and misgivings; in doing so, they construct frames or imaginaries about the public's understandings of science and technology and the potential threats that public opposition poses to industrial innovation and new technologies.

Welsh and Wynne (2013) expand on Wynne's work on states and publics by discussing how the state's "imaginaries" of the public have changed. Their definition of imaginaries refers to Taylor's (2002) use of the term as the means of making sense of social life and of normatively guiding it, an approach that is consistent with the idea of culture as models of and for action (Geertz 1973). They argue that elite imaginaries of the public have undergone a significant change from "passive non-entities, circa 1950–1990 (continuing); as incipient threats due to presumed deficits in their grasp of science 1990–2000 (continuing); and, since circa 2000, as politicised threats requiring state control" (2013: 540). They also argue that the state's

management strategies in response to public opposition include both public participation processes and the surveillance and repression of opposition groups. In drawing attention to the latter, they explicitly connect the fields of science and technology studies (STS) and social movement studies (SMS), and they suggest that the concept of an ‘imaginary’ is a way to bridge the fields. Thus, they also present two underlying arguments: 1) there is much to be gained from the integration of science and technology studies (STS) and social movement studies (SMS), and 2) cultural analysis, employed here as the interpretation of imaginaries, provides an important vehicle to advance the study of science, technology, and publics.

Because I do not disagree with the general lines of their argument, I instead suggest two main ways to build on their essay. First, I argue that the next step is to examine differences within and among the state, industry, and mobilized publics and associated imaginaries. Second, I discuss some of the broader methodological and conceptual issues that emerge in the project of integrating STS and SMS, including the role of cultural analysis (such as the study of imaginaries) in the project of bringing together the two fields.

Publics as Threats to Technological and Industrial Progress

When government and industry leaders respond to or anticipate public acceptance issues having to do with industrial innovation, they do so via their models of the public that have variously been described as imaginaries, discourses, and frames. Thus, in the tradition of the etic/emic distinction in cultural anthropology, the analysis of imaginaries can involve both the elites’ perceptions of the public’s views of technology and the actual public perceptions as determined by researchers. One of the resulting research problems that can emerge at the intersection of STS and SMS is the study of the differences in how elites perceive publics with respect to industrial technology and how the publics perceive themselves, industrial technology, and elites. This research problem can also lead into higher order analyses of perceptions of perceptions, that is, a fully developed cultural analysis of states and publics, but the point that will be developed here is that a pluralizing strategy is useful for the analysis of publics, elites, and imaginaries.

For example, with respect to the category of the “public,” public acceptance issues can involve the individualized views of lay persons as well as those of advocacy organizations and social movements. These two types of the public—the “lay individual” public and the “mobilized” public—also interact not only with the elites but with each other, because one of the goals of advocacy organizations and social movements is to mobilize the broad public to put pressure on the state and industry to change. The mobilized publics can also contest the official imaginaries of the public as threat and can pose counter-imaginaries of the state, industry, and sociotechnical futures. Likewise, there are often significant divisions among mobilized publics both in terms of organizations and in terms of their frames and imaginaries.

It follows from this perspective that there is not a monolithic state imaginary of the public, at least in open societies with basic freedoms of speech. To mention one of the most relevant of such divisions, there are generally important linkages between social movements (e.g., environmental, labor, consumer, civil rights, and feminist) and left political parties, and the representatives of left parties in the state tend to contest official imaginaries of the public that are articulated by political leaders who hold views associated with industry. Likewise, the category of industry is also not monolithic, and sometimes one industry acts as a countervailing

power with respect to another. For example, in the case of policies regarding the transition to low-carbon energy in the U.S., there are sometimes sharp divisions between the fossil-fuel industry and portions of the technology and venture capital sectors that support a green transition (Hess 2014b). Finally, the state also has interests in security, defense, economic well-being, and public welfare that can be at odds with industry, and the state's economic and regulatory policies may trigger opposition from some industrial sectors but not others.

Another layer of complexity in the relations among states, industries, and publics is the valence of the relationship. States and industries may perceive public opposition as threats or as legitimate perspectives that should be addressed with regulation and/or redesign, and publics may also think about technologies and regulatory policy (their "imaginaries" of technological futures) in more or less favorable terms. For example, social movements can oppose industrial technologies, but they can also serve as laboratories of grassroots innovation that can lead to the launching of new industries (Hess 2007a). Likewise, states do not play only a repressive role that identifies publics as threat; they can also play a mediating role in conflicts between movements and industries. Industries may also respond to movements by perceiving them as threats (and these perceptions predate the rise of the terrorist-oriented security state, e.g., Gottlieb 1993), but they can respond to movements by seeing the public concerns as opportunities for innovation and new market development. Furthermore, if one's view of the state is not restricted by pluralist commitments, then one could defend the argument that the "imaginaries" of industry, when different from those of the state, may even be the more important factor in the policy process and disputes than those of the state, depending on the policy issue and government.

To provide an example of how one might develop Welsh and Wynne's argument about the imaginary of public as threat, and in the process to develop one articulation of STS and SMS, I specify four types of mobilized publics and discuss the imaginaries associated with each: industrial opposition movements, justice movements, alternative industrial movements, and regime preservation movements.

Industrial opposition movements call for a moratorium or major design change for particular technology, such as pesticides, nanotechnology, biotechnology, electromagnetic fields, and highways. The call for a total moratorium is realized only rarely, but the movements often achieve a partial moratorium or design change on specific dimensions of a technology or product, and the calls for a full moratorium provide a powerful radical flank effect for reformers (Hess 2007a). This type of movement is most likely to trigger imaginaries of public as threat from industrial and associated political elites. In some cases, as in nanotechnology policy, the response can be to push forward the technology against the public threat but to provide some assurances in the form of higher levels of environmental, health, and safety research (Hess 2010). In other cases, governments may respond to calls for a moratorium by shifting technological implementation from a mandate to consumer choice, as has occurred with the implementation of opt-out provisions in response to public opposition to smart meters (Hess 2014a). So the imaginary of public as threat is not always connected with repression; it can also be associated with policy responses that anticipate or address public opposition.

Another kind of mobilized public is also oppositional, but it generally poses a more narrow challenge to existing industrial regimes, and it is focused on imagined futures of social justice rather than of different technologies. The primary example is the politics of communities

that oppose unwanted industrial risks and hazards. Although government can be involved, the primary threat of environmental justice mobilizations is to specific corporations, which are at risk of losing siting opportunities, brand loyalty, and profits. These struggles can result in the chessboard politics of moving industrial hazards in response to not-in-my-backyard mobilizations. Here, the public threat is often localized and manageable, and the uses of repressive mechanisms may not be necessary if local elites can be recruited and coopted. The threat is less to the state than to industry or even to a specific firm, and it is less a broad threat to national interest and more a specific threat posed to corporate profits and to employment prospects in a regional economy.

However, it is important not to restrict the concept of a mobilized public threat to industrial opposition and justice movements. Another category of mobilized public with respect to technology is the alternative industrial movement, which generally operates through institutionalized channels rather than through disruptive tactics and can include advocates, entrepreneurs, scientists, and countervailing industries. These movements call for the shift in corporate product standards (such as in certification movements) or support for the development of new technologies and products. Both approaches are generative of industrial innovation, such as occurred in the movements in support of organic food, solar energy, complementary and alternative medicine, and new urbanist planning (Hess 2007a). These movements have a different politics from that of the moratorium, and the threat is more one that challengers pose to industrial incumbents. In other words, there is a threat to industry profits and market share that accompanies a possible scale shift in a niche technology that could disrupt the existing industrial regime.

One example is the movement for solar energy that led to the development of the solar industry in the U.S. Mobilized publics such as environmentalists pushed for government policies that opened opportunities for the solarization transition, and the policy changes enabled the growth of start-up firms that created an industry that in turn led to support from a countervailing industry (the financial and technology sector), whose investments in third-party ownership contributed to the scale shift. As in the case of state imaginaries of threat, in this case industry imaginaries of threat appear in media reports and industry statements, such as a report by the utility industry that likens its situation to that of Kodak in the face of digital photography or Blackberry in the face of the i-phone (Kind 2013). Here, the threat is partially from a mobilized public of environmentalists, but it is also from consumers (who may desert the regime technology) and from new firms and new products. This kind of threat can be met with a politics of incorporation (buy-outs of the challenger firms) and transformation (design modifications of the disruptive technology), that is, with industrial innovation.

A fourth type of public threat emerges when an industry is faced with major policy shifts that could lead to the sunseting of its main operations, and it mobilizes public opposition to the policies. In some cases the concept of an astroturf (industry-backed) movement may be helpful, but it can be difficult to distinguish astroturf movements from broader populist movements (Wear 2014). A good example of this configuration of public threat is the role of the fossil-fuel industry in supporting climate denialism among think tanks, the media, and right-wing political movements (Hess 2014c). In the U.S. climate denialism and financial support from the fossil-fuel industry have been central features of the rise of the Tea Party candidates, but the Tea Party movement cannot be reduced to climate transition politics or to an industry front group. Again,

a method that begins with divisions within and among states, industries, and publics is important: there is no public threat for the political leaders associated with the movement (the right wing of the Republican Party), but there is a significant threat for the moderate wing of the Republican Party and for Democrats who support a green transition strategy. For industry, the threat is to the emergent industry (renewable energy), which perceives the tremendous influx of political spending from the fossil-fuel sector as a threat to imaginaries of a low-carbon future predicated on an industrial transition.

In summary, one way to advance cultural and other analyses of mobilized publics is to pluralize the concept of public as threat based on divisions within and among the state, industry, and mobilized publics. However, there are also broader issues regarding the theoretical and methodological grounds on which such research can and should proceed. I thus turn to the two underlying issues raised by the study of mobilized publics and perceptions of publics as threat to technological and industrial innovation: the integration of STS and SMS as research fields, and the role of cultural analysis (such as the concept of the imaginary) in the integration of the fields. Because I have been a proponent of both the integration of the fields and the use of cultural analysis, this essay will focus on some general issues that emerge in how best to implement such agendas.

STS and SMS

Both STS and SMS have much to gain from an ongoing conversation, and in fact the integration can be transformative for both fields. From the STS side, arguably the most central change involves reconceptualizing the idea of the public with respect to scientific knowledge and technology policy. Wynne (2005, 2007) has developed the critique of the deficit model into a more general critique of the scientization of politics and the tendency for policy-makers to rely heavily on risk assessment, which can be used to exclude broader societal concerns over technology policy. Welsh and Wynne (2013) build on this research to suggest that these broader concerns tend to be raised especially by advocacy organizations and social movements. Furthermore, as the STS literature now generally recognizes, the machinery of lay consultations, consensus conferences, and other deliberative and consultative practices enables elites to access and configure the lay public, and the mechanisms of public participation are often designed to leave out the social movement and advocacy organizations by defining them as stakeholders, that is, as an unwanted and uninvited form of the public (Lezaun and Sonyerd 2007).

The introduction of social movements and advocates into the study of sciences and publics reveals a potential area of agreement in the analysis of the deficit model and its critique to the extent that both focus on a definition of the public as individualized lay opinion (Hess 2011). There is now a third approach in the conversation about the public—"mobilized publics"—a concept that was articulated by Bourdieu in his discussion of publics and "mobilized opinion" (1993: 155). The study of the public understanding of science therefore undergoes a transition: it is now in the world of relations between mobilized counterpublics and both the nonmobilized but potentially mobilizable lay person and the official publics which the counterpublics hope to move. Furthermore, because mobilized publics can acquire greater credibility when they are constituted as "scientific counterpublics" that can include scientists in addition to activists and advocates, the analysis of mobilized publics requires disaggregating not

only the category of the public but also that of science (e.g., merchants of doubt, mainstream scientists, and marginalized scientists, Hess 2011). These counterpublics can point out not only the anti-democratic implications of scientized decision-making but also the need to remedy the problem of undone science, that is, the systematically produced non-knowledge that, if funded, could serve a broad public benefit (Frickel et al. 2010). Thus, this shift in focus in the study of publics also accompanies a broadening in the focus of STS to the study of ignorance and non-knowledge.

On the SMS side, there is similar potential for rethinking fundamental concepts. There are already various attempts in the field to move beyond resource mobilization, framing, and political opportunity structures as core concepts, and these efforts include the study of the outcomes of social movements, of why mobilizations do not occur, and of cultural dimensions of social movements. One way that STS has contributed to this ongoing diversification of SMS is to bring greater attention to the epistemic dimensions of social movements and in the process to expand the primary “object” of SMS from disruptive, protest-based movements to reform movements both within the scientific field and in the industrial and political fields. Pioneered by Eyerman and Jamison (1991), work on the epistemic dimensions of social movements includes the role of citizen-scientist alliances in challenging dominant paradigms (Brown 2007, McCormick 2009), the negotiation of scientist-movement relations (Allen 2003, Clarke 1998, Lubitow 2013, Yearley 1992), the suppression of scientists who adopt positions consistent with social movements (Delborne 2008, Martin et al. 1986), the role of social movements in the general unbinding of scientific authority from scientists (Moore 2008), the effects of social movements on research fields (Frickel and Gross 2005) and on the politicization of scientists (Moore 1996), the dilemmas presented to movement strategy by a scientized and technocratic decision-making structure (Kinchy 2012), the transition of activists into experts (Epstein 1996) and communities into lay researchers (Ottinger 2010), the generative role of industrial reform movements in technological innovation and industrial change (Hess 2007a), the creation of new knowledge by social movements and advocacy organizations through civil society research (Hess 2009, Kinchy 2012), the inclusion of new voices in science and its effects on objectivity (Harding 1991), the interaction of movement mobilizations with epistemic cultures of national research communities (Suryanarayanan and Kleinman 2014), the relationships between technologically oriented social movements and neoliberalism (Moore et al. 2011), and the emergence of epistemic rift in the science-state-public relationship (Hess 2014c).

In summary, the project of bringing STS and SMS into conversation involves rich, even potentially transformative opportunities for both fields. Furthermore, the project of bringing together STS and SMS can best proceed by recognizing and engaging the concepts and research of the work at the intersections of the two fields.

Cultural Analysis and the Study of Publics as Threats

As the attention to imaginaries of public threat suggests, one way forward in the STS-SMS interface is based on the cultural analysis of publics and perceptions of publics with respect to science, technology, and industrial innovation. Anthropologists and cultural historians provided one important influence on the cultural analysis of science when they led the shift of the focus of the study of science and technology to its cultural meanings outside the laboratory or ‘beyond the citadel’ of academic science (e.g., Downey and Dumit 1998, Haraway 1989, Hess

1995, Marcus 1994). This development occurred in parallel with emerging work on the public understanding of science (Wynne 1996), and, somewhat later, on publics and expertise (Collins and Evans 2002) and on sociotechnical imaginaries (Jasanoff and Kim 2013). Thus, a range of convergent developments suggested the value of shifting toward the study of science and publics, and methods rooted in the culture concept were often part of this change.

As suggested above, the concept of the imaginary is a variant on the culture concept and can be situated as part of a broader family of culture concepts, including code (Lévi-Strauss 1995), cultural logic (Marcus and Fischer 1999), cultural pattern (Benedict 1934), cultural system (Geertz 1973), discourse and practice (Foucault 1970), governmentality (Foucault 2008), ideology (Dumont 1977), frame (Bateson 1972), and institutional logic (Friedland and Alford 1991). Although there are important distinctions both within the concept of imaginaries and between imaginaries and related concepts, there is also an underlying family resemblance among methods that have as their goal something akin to Geertz's call for an interpretive science that attends to webs of meaning (1973). Furthermore, cultural analysis can be used for cultural history, including analyses that utilize a periodization strategy. However, rather than focus on specific aspects of the method for studying imaginaries and distinctions among imaginaries and related concepts, I will discuss instead some largely methodological issues that emerge with cultural analysis in general. This is particularly important for the project of integrating STS and SMS, because there are significant differences of approach in the two interdisciplinary fields. Three, inter-related issues of methodology should be considered.

One of the potential shortcomings of cultural analysis is that everything can be swept under the rubric of an encompassing cultural logic (sometimes configured diachronically) such as the Renaissance episteme, neoliberal governmentality, or a national imaginary. As Rose and colleagues argue with respect to neoliberal governmentality, it has become a "more or less constant master category that can be used both to understand and to explain all manner of political programs across a wide variety of settings" (2006: 97). This problem can occur with the study of imaginaries, where there may be a tendency to focus on broad imaginaries of the government in a particular country or at a particular time period. There is a risk for the analysis to slide toward some of the methodological issues associated with older versions of the culture concept in anthropology, where entire societies were defined according to a culture pattern (Benedict 1934).

An alternative approach is consistent with the general shift in the understanding of the culture concept from a system of shared meanings that is structured like a language to a field of contested meanings that is structured like a multivocal text or multilingual society. This shift distinguishes the Geertzian analysis of cultural systems (e.g., ideology, religion, or common sense) from post-Geertzian analyses that focus on contested meanings and power (e.g., Gupta and Ferguson 1997). From this perspective, as outlined above in a schematic way, an important next step in the analysis of imaginaries of public as threat to industrial innovation and technoscientific progress is to track and interpret oppositional imaginaries. This approach, an analysis of 'contested imaginaries,' is based on the idea that mobilized publics not only contest the assumptions of official imaginaries but also create their own imaginaries. Furthermore, under the pluralizing (but not pluralist) assumption discussed above, the study of contested imaginaries also includes the production of different imaginaries among elites.

But the study of contested imaginaries can be more than a semiotic analysis of the

diacritics of meaning; it should also be connected with social position and power in the sense of the capacity to change events. This leads to a second issue in the methodology of cultural analysis: no matter how thick and differentiated the description, it is richer when differences in imaginaries (or other cultural meanings) are connected to differences in social positions. In Bourdieu's eyes, this additional layer of analysis distinguished him from Foucault, whom he described as refusing 'to look anywhere except in the "discursive field" for the principle that will elucidate each of the discourses inserted in it' (1991: 11). Whether or not one agrees with the assessment of Foucault, there is a broader point that in some cases the analysis of imaginaries, cultural logics, discourses, practices, and so on can become trapped in a 'culturalist' mode of symbolic interpretation. Of course, the other methodological problem—the 'short circuit' (Bourdieu 1990) of explaining contrasting imaginaries or other systems of meaning as expressions of broad social structural conflicts—is an equal and opposite risk that tends to plague some forms of Marxist and Marx-influenced analysis. Indeed, the ill-fated history of interests analysis in STS may have contributed to the field's tendency to culturalism.

Understanding these issues is also important for those who wish to develop the project of an articulation of STS and SMS, because the pull toward culturalism and push away from social structural analysis is quite different, even somewhat opposite, in the two research fields. This is partly because STS is more evenly divided between humanistic and social science networks, whereas SMS is much more of a social science endeavor anchored principally in sociology. These issues have emerged in the parallel discussions of frame analysis in SMS, where sociologists have attended to the issues involved in the integration of the analysis of frames and structural conditions (e.g., McVeigh et al. 2004).

The issue of disciplinary divisions leads to a third methodological issue that emerges with respect to cultural analysis. Work in STS that utilizes the concept of the imaginary, including the essay by Welsh and Wynne on state imaginaries of the public, is generally written in the vein of cultural anthropology or cultural history. Both fields tend to be concerned with the idiographic (e.g., the study of a specific social movement) in contrast with the goal of developing nomothetic knowledge (e.g., a theory of social movements or interest groups), which is more salient in sociology and political science. There is a place for both idiographic and nomothetic research, and the relative weighting of one or the other can vary across a single person's corpus (as it does in my own and in that of Welsh and Wynne), so drawing this distinction is not intended to devalue any particular approach. Instead, I am drawing attention to a more general issue in the project of the integration of STS and SMS. By recognizing and making explicit the disciplinary differences in emphasis, it would be possible to avoid the "paradigm" clashes that sometimes emerge in interdisciplinary conversations, especially between anthropology and sociology (Hess 2007b). Furthermore, the conversations between STS and SMS could become more self-conscious about, for example, selective preferences for one approach to the study of social movements (e.g., the more historical new social movement theory versus the more nomothetic contentious politics theory).

What would a more nomothetic approach for the study of science, technology, states, industries, and social movements/mobilized publics look like? With respect to cultural analysis, it would include explanation of the middle-range type, such as the conditions under which imaginaries emerge, gain traction, and fade away. But a middle-range explanatory strategy could also theorize the conditions that affect historical outcomes such as policy change,

scientific and technological change, and industrial transitions and stasis. Undoubtedly, the deployment of successful framing strategies or imaginaries can provide one set of explanatory factors for this broader project, but they are only one factor among many, and the relative explanatory importance of imaginaries in shaping outcomes may be secondary to other factors. For example, the analysis might also focus on factors such as how elites use scientized policy processes, suppress scientists, create epistemic rift in the media and legislatures, and incorporate industrial challengers, and alter alternative designs. Likewise, with respect to mobilized publics research could include the mechanisms used by opposition coalitions to contest to shape alternative historical outcomes, such as the development of civil society research and participatory research, the mobilization of citizen-scientist coalitions and scientific/intellectual movements, the expertification of lay advocates and activists, and the recruitment of countervailing industrial power. In summary, cultural analysis can be a valuable aspect of the integration of STS and SMS, but there are also other approaches that may be just as valuable, especially when the integration is based on a social science project of explaining political, scientific, technological, and industrial change.

Conclusion

There is a need to advance the study of the public understanding of science in a new direction that focuses on mobilized publics and the responses of government and industrial elites to them, including perceptions of the publics as threats. Advancing the literature in this direction requires the integration of the fields of STS and SMS, and doing so requires attention to several methodological and conceptual issues.

The analytical framework, whether it uses cultural analysis or some other method, should begin with divisions within and among the public, industry, and the state. There is also a need to include in the analytical frame the long-term and pervasive conflicts between social movements and industries, which are especially prominent in societies where democratic processes are weak and industrial hegemony is strong. This does not mean ignoring the agency of the state or viewing the state and its disparate elements as only a battleground, and certainly the study of public as threat and the STS-SMS interface can include mobilizations directed against government projects of technological change as well as those of industry. However, one should also include relations between industries and movements, either with or without mediation by the state.

When cultural analysis is applied to divisions within and among publics, states, and industries, it should also attend to contestation over meanings, including the analysis of contested imaginaries when imaginaries are the object of study. But the analytical project need not stop at this point; it should include attention to the connections between social positions and imaginaries and to the explanation of the factors that shape the development and decline of imaginaries and the factors that affect the outcomes of political, scientific, technological, and industrial change. Building social theory at the boundaries of STS and SMS can benefit from engaging the already existing literature, which has made significant progress with respect to the scope of empirical research and to conceptual development.

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References

- Allen, B. (2003). *Uneasy Alchemy: Citizens and Experts in Louisiana's Chemical Corridor Disputes* (Cambridge, MA: MIT Press).
- Bateson, G. (1972) *Steps to an Ecology of Mind*. (New York: Ballantine).
- Benedict, R. (1934) *Patterns of Culture* (Boston: Houghton-Mifflin).
- Bourdieu, P. (1990). Animadversiones in Mertonem, in: J. Clark, C. Modgil, and S. Midgil (Eds), *Robert Merton: Consensus and Controversy*, pp. 297-301 (New York: Falmer Press).
- Bourdieu, P. (1991) The history of scientific reason, *Sociological Forum*, 6(1), pp. 3-26.
- Bourdieu, P. (1993) *Sociology in Question* (Thousand Oaks, CA: Sage).
- Brown, P. (2007) *Toxic Exposures: Contested Illnesses and the Environmental Health Movement* (New York: Columbia University Press).
- Clarke, A. (1998) *Disciplining Reproduction: Modernity, American Life Sciences, and 'the Problems of Sex'* (Berkeley, CA: University of California Press).
- Collins, H., and Evans, R. (2002) The third wave of science studies: studies of expertise and experience, *Social Studies of Science*, 32(2), pp.235-296.
- Delborne, J. (2008) Transgenes and transgressions: scientific dissent as heterogeneous practice, *Social Studies of Science*, 38(4), pp.509-541.
- Downey, G., and Dumit, J. (1998) *Cyborgs & Citadels: Anthropological Interventions in Emerging Technosciences* (Santa Fe, NM: School for American Research Press).
- Dumont, L. (1977) *From Mandeville to Marx: Genesis and Triumph of Economic Ideology* (Chicago: University of Chicago Press).
- Epstein, S. (1996) *Impure Science: AIDS, Activism, and the Politics of Knowledge* (Berkeley, CA: University of California Press).
- Eyerman, R., and Jamison, A. (1991) *Social Movements: A Cognitive Approach* (University Park, PA: Pennsylvania State University Press).
- Foucault, M. (1970) *The Order of Things* (New York: Vintage).
- Foucault, M. (2008) *The Birth of Biopolitics: Lectures at the Collège de France, 1978-1979* (London: Palgrave Macmillan).
- Frickel, S., Gibbon, S., Howard, J., Kempner, J, Ottinger, G., and Hess, D. (2010) Undone science: social movement challenges to dominant scientific practice, *Science, Technology, and Human Values*, 35(4), pp. 444-473.
- Frickel, S. and Gross, N. (2005) A general theory of scientific/intellectual movements, *American Sociological Review*, 70(2), pp. 204–32.
- Friedland, R., and Alford, R. (1991) Bringing society back in: Symbols, practices, and institutional contradictions, in W. Powell and P. DiMaggio (Eds) *The New Institutionalism in Organizational Analysis*, pp. 232–266 (Chicago: University of Chicago Press).
- Geertz, C. (1973) *The Interpretation of Cultures* (New York: Basic Books).
- Gottlieb, R. (1993) *Forcing the Spring: The Transformation of the American Environmental Movement* (Washington, D.C.: Island Press).
- Gupta, A., and Ferguson, J. (1997) *Culture, Power, Place: Explorations in Critical Anthropology* (Durham, NC: Duke University Press).

- Haraway, D. (1989) *Primate Visions*. New York: Routledge.
- Harding, S. (1991) *Whose Science? Whose Knowledge? Thinking from Women's Lives* (Ithaca, NY: Cornell University Press).
- Hess, D. (1995) *Science and Technology in a Multicultural World* (New York: Columbia University Press).
- Hess, D. (2007a) *Alternative Pathways in Science and Industry* (Cambridge, MA: MIT Press).
- Hess, D. (2007b) Crosscurrents: social movements and the anthropology of science and technology. *American Anthropologist*, 109(3), pp. 463-472.
- Hess, D. (2009) The potentials and limitations of civil society research: Getting undone science done, *Sociological Inquiry*, 79(3), pp. 306-327.
- Hess, D. J. (2010) Environmental reform organizations and undone science in the United States: exploring the environmental, health, and safety implications of nanotechnology, *Science as Culture*, 19(2), pp. 181–214.
- Hess, D. (2011) To tell the truth: On scientific counterpublics, *Public Understanding of Science*, 20(5), pp. 627-641.
- Hess, David J. (2014a) Smart meters and public acceptance: comparative analysis and governance implications, *Health, Risk, and Society*, forthcoming.
- Hess, David J. (2014b) Sustainability transitions: A political coalition perspective. *Research Policy*, 43(2), pp. 278-283.
- Hess, D. (2014c) When green became blue: epistemic rift and the corralling of climate science, *Political Power and Social Theory*, 27, pp. 123-153.
- Jasanoff, S., and Kim, S. (2013) Sociotechnical imaginaries and national energy policies, *Science as Culture*, 22(2), pp. 189-196.
- Kinchy, A. (2012) *Seeds, Science, and Struggle: The Global Politics of Transgenic Crops* (Cambridge, MA: MIT Press).
- Kind, P. (2013) *Disruptive Challenges: Financial Implications and Strategic Responses to a Changing Retail Electric Business* (Washington, D.C.: Edison Electric Institute).
- Lévi-Strauss, C. (1995) *Myth and Meaning: Cracking the Code of Culture* (New York: Schocken).
- Lezaun, J., and Soneryd, L., (2007) Consulting citizens: technologies of elicitation and the mobility of publics, *Public understanding of science*, 16(3), pp. 279-297.
- Lubitow, A. (2013) Collaborative frame construction in social movement campaigns: Bisphenol-A and scientist-activist mobilizations, *Social Movement Studies*, 12(4), pp. 429-44.
- Marcus, G. (ed) (1994) *Technoscientific Imaginaries: Conversations, Profiles, Memoirs*. Chicago: University of Chicago Press.
- Marcus, G.E., and Fischer, M. (1999) *Anthropology as Cultural Critique: An Experimental Moment in the Human Sciences* (Chicago: University of Chicago Press).
- Martin, B., Baker, C., Manwell, C., and Pugh, C. (Eds) (1986) *Intellectual Suppression* (London: Angus and Robertson).
- McCormick, S. (2009) *Mobilizing Science: Movements, Participation, and the Remaking of Knowledge* (Philadelphia: Temple University Press).
- McVeigh, R., Myers, D., and Sikkink, D. (2004) Corn, Klansmen, and Coolidge: structure and framing in social movements, *Social Forces*, 83(2), pp. 653-690.
- Moore, K. (1996) Organizing integrity: American science and the creation of public interest science organizations, 1955–1975, *American Journal of Sociology*, 101(6), pp. 1592–

1627.

- Moore, K. (2008). *Disrupting Science: Social Movements, American Scientists, and the Politics of the Military, 1945-1975* (Princeton, NJ: Princeton University Press).
- Moore, K., Frickel, S., Hess, D., and Kleinman, D. (2011) Science and neoliberal globalization A political sociological approach, *Theory and Society*, 40(5), pp. 505-532.
- Ottinger, G. (2010) Buckets of resistance: Standards and the effectiveness of citizen science, *Science, Technology, and Human Values*, 35(2), pp. 244-270.
- Rose, N., O'Malley, P., and Valverde, M. (2006) Governmentality, *Annual Review of Law and Social Science*, 2, pp. 83-104.
- Suryanarayanan, S., and Kleinman, D. (2014) Beekeepers' collective resistance and the politics of pesticide regulation in France and the United States, *Political Sociology and Social Theory*, in press.
- Taylor, C. (2002) Modern social imaginaries, *Public Culture*, 14(1), pp. 91–124.
- Wear, R. (2014) Astroturf and populism in Australia: the convoy of no confidence, *Australian Journal of Political Science*, 49(1), pp. 56-67.
- Welsh, I. & Wynne, B. (2013) Science, scientism and imaginaries of publics in the UK: Passive objects, incipient threats, *Science as Culture*, 22(4), pp. 540-566.
- Wynne, B. (1996) Misunderstood misunderstandings: Social identities and public uptake of science, in: A. Irwin and B. Wynne (Eds), *Misunderstanding Science? The Public Reconstruction of Science and Technology* (Cambridge: Cambridge University Press).
- Wynne, B. (2005) Risk as globalizing 'democratic' discourse? Framing subjects and citizens, in: M. Leach, I. Scoones, and B. Wynne (Eds) *Science and Citizens: Globalization and the Challenge of Engagement*, pp. 66-82 (London: Zed).
- Wynne, B. (2007) Public engagement as a means of restoring public trust in science: Hitting the notes, but missing the music? *Community Genetics*, 9(3), pp. 211-220.
- Yearley, S. (1992) Green ambivalence about science, *British Journal of Sociology*, 43(4), pp. 511–32.