Chapter 17
The Perils, Politics, and Promises of Activist Science

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Abstract This paper considers "activist scientists": those who become socially or politically active and transgress traditional scientific cultural norms of impartiality and neutrality. Such overt political positions are often connected to instances in which scientists bypass usual lines of scientific communication and popularization, and take research findings or expert opinions directly to the public. This paper examines the case of Andrew Weaver, a prominent Canadian climate scientist who has become an active proponent of climate change action, as well as a vociferous critic of the perceived inadequacy of government policy. His activism garnered him a significant amount of unflattering attention which ostensibly related to the appropriate scope of scientists' activities. Historical reflections on the relationship between ecology and the environmental movement suggests that such activism is typically tied to "crisis situations," which often lead to major boundary reworkings regarding the proper role of science. Such boundary reworkings present an opportunity to consider the ways that scientists imagine their own identities and how these compare to public expectations of scientists, as well as challenge certain STS conceptions of expertise.

Keywords Activist science • Climate change • Science popularization • Public engagement • Public understanding of science

Introduction

This chapter explores the intersections of science communication, public scientists, and activism. In particular, it looks at the activities of climate scientists who have, for various reasons, decided to take a pronounced public role in the promotion of

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climate change activism especially through media like newspapers, television, and websites and blogs. Such cases open up a set of generative and provocative questions. An immediately apparent point of inquiry is the recognition that activist scientists transgress traditional norms of scientific behaviour, most notably impartiality and political neutrality. Given the penchant in Science and Technology Studies (STS) for questions of boundary making, this is an analytically rich starting point.[1] What contingent sociological, political, and cultural factors account for these deviations from accepted standards of scientific practice? How exactly are the transgressed boundaries conceptualized by scientists? What is it about activism that appears to conflict with scientific norms? How do activist scientists attempt to cope with these tensions? What kinds of boundary reimaginings occur? What risks do activist scientists face in taking on public, activist roles?

As other contributors to this volume will likely note, the role of activism in science pedagogies has received scant attention. There has similarly been a dearth of research on the relationship between activism and science. Those studies that do exist typically explore the interactions between citizen activist groups and scientists, and these case studies tend to focus on the conflicts between activist or public interest groups and scientific experts (Kroll-Smith and Floyd 1997). There are studies that consider instances of cooperation, but are typically framed in terms of lay-expert divides, or uneasy alliances, or the enlisting of scientific expertise for activist purposes (e.g., Delgado 2010; McCormick 2007). Rarely are scientists themselves considered as activists (Frickel 2004).

Overall, this chapter explores these issues from a position of reconstructivist STS. This denotes a critical perspective that is sympathetic to, or aligned with, activist positions. At its most pronounced, reconstructive STS is explicitly normative. It does not, in the name of methodological impartiality or scholarly objectivity, shy away from making value judgments about scientific and technological practices, controversies, and assemblages. Indeed, it actively seeks to reimagine and reconstruct ethical technoscience. More modestly, it is reflexive about the normative potential of STS analyses – how it might be enrolled by various agents – and its own socially constructed nature. As such, this chapter is generally aligned with climate change activism, and may offer some modest lessons to practicing scientists who have also enrolled themselves in this cause.

While this analysis does not situate itself explicitly in practices and theories of activist STME, especially not in a formal way, there are insights for those thinking about such things. Firstly, while formal educational structures are integral to understanding the role and possibilities of activism in science education, it is important to note that when the public understanding of a particular scientific (or socio-scientific) issue becomes a concern, the majority of this public falls outside the reach of formal educational structures. Hence the need to look at broader attempts to educate or "raise

[1] Here I don't mean to favour any particular disciplinary formation; by "STS" I am referring to all work that examines science and technology from diverse historical, sociological, anthropological, cultural, etc. perspectives.

awareness" among the public (see Bowen, Chap. 16). Secondly, STME and STS have mutually benefitted from numerous interactions in recent years. In particular, the teaching of STM has been increasingly grounded in socio-scientific issues, and so STME has increasingly shared case studies, resources, and goals with STS. Furthermore, effective activism takes place at multiple sites and from multiple perspectives, and this chapter aims to contribute to such cross-pollinations. This chapter considers two brief case studies of science activism and advocacy that lend themselves to analysis from multiple perspectives. These cases ultimately complicate STS notions of symmetry and impartiality, revealing that the diverse ways in which science is political demand different ethical considerations, and arguably establish the need for clear demarcations between science and politics.

The Perils of Activist Science

Consider the case of Andrew Weaver, a Canadian climate modeller working in the School of Earth and Ocean Sciences at the University of Victoria. Weaver is an established climate scientist, with over 130 peer-reviewed publications and numerous research awards, and author of two popular books on the science and politics of climate change. He was also a lead author on various chapters in the second, third, and fourth Intergovernmental Panel on Climate Change (IPCC) Assessment Reports, and will serve as a lead author on the upcoming Fifth Assessment report.

Starting in the mid-1990s Weaver was occasionally recruited by news organizations to be a source in stories about climate change, mainly because of his role on the IPCC. He soon ended up on newswire source lists, and became a go-to source for stories about climate change in Canadian media. For various reasons, Weaver eventually took a more proactive role in public engagement. In 1996 he co-penned with his colleague Ken Denman a brief letter to the editor of the *Globe and Mail* in response to disparaging remarks made by then business columnist Terence Corcoran about the review process of the 1995 IPCC assessment report, for which Weaver was a co-author (Denman and Weaver 1996). Weaver and Denman rejected Corcoran's claim that the IPCC had expunged the concerns and doubts of sceptical scientists in order to make the case for anthropogenic global warming. Instead, they argued that the IPCC report had been inherently conservative in its proclamations, precisely because they had overplayed sceptical concerns in order to facilitate approval from reluctant member countries. Since then Weaver has become more vocal in his attempts to bring attention to the issue of anthropogenic climate change and increasingly critical of what he sees as inadequate political action. In his book, *Keeping Our Cool*, Weaver professed his belief that "global warming is the single biggest issue facing humanity today" and was highly critical of the Canadian government's "obstructionist" positions and policies on climate change (Weaver 2008, pp. 28, 274). Due to such public engagement activities, 13 years later Weaver would again find himself in a dispute with Corcoran, now a columnist for the *National Post*.

The *National Post* is typically considered to be a "conservative" or "right-leaning" newspaper (Uzelman et al. 2005; DiFrancesco and Young 2011). Editorially they have taken a pronounced sceptical view of climate change, frequently running editorials which challenge scientific theories of anthropogenic climate change, denigrate climate scientists and institutions like the IPCC, and offer ample space to scientists offering alternative theories of global warming. Ironically, one of Weaver's first more pronounced forays into public engagement was a opinion piece published in the *National Post* regarding an earlier piece by skeptical scientist Fred Singer (Weaver 1999). The first bit of negative attention regarding Andrew Weaver in the *National Post* was a few brief paragraphs in a vociferous and scathing attack by Corcoran of an article that ran in the *Globe and Mail* written by Charles Montgomery, which critiqued the activities of Canadian climate skeptics (Corcoran 2006a; Montgomery 2006). In the editorial, without any clear segue, Corcoran suggests that Montgomery's "lapse on facts" had been influenced by Weaver's questionable (as alleged by Corcoran) criticism of the prominence afforded to climate sceptics in Canada, as well as perceived Government inaction. Corcoran goes on to state that Weaver is amongst the most politically-driven players in climate change debate, loudly implying that his scientific views have been compromised by partisanship.

Weaver responded with a letter asking for corrections to be made, mostly regarding factual errors regarding his place of employment (Weaver 2006). The *National Post* issued an editorial statement acknowledging error and offered corrections to information regarding Charles Montgomery, but not to Weaver. Corcoran himself penned a mock apology that conjectured that no errors had been made (Corcoran 2006b). When he called Weaver a "civil servant," for example, Corcoran claimed that he did not mean it in the conventional sense as somebody who works for a government agency, and suggested that any discerning reader would be able to pick up on that fact that Weaver was a metaphorical servant of the state because he has received funding from the government at various points in his career. Corcoran also repeated a claim that had appeared in an earlier piece in the *Post* that Weaver had called a paper allegedly debunking the so-called Hockey-Stick Graph "pure and unadulterated rubbish." Weaver pointed out that the quotation was erroneous and had already been the subject of any earlier editorial correction and retraction, but the *Post* decided not to re-issue a correction in this instance.

After 3 years of relative calm, Peter Foster (2009), another *National Post* columnist, wrote an attack piece about Weaver that labeled him "Canada's warmist spinner-in-chief" and said he had become part of the "left coast Suzuki-PR-industrial complex" (for non-Canadian readers, this reference is to David Suzuki, Canada's most well-known environmental activist, and most derided by the likes of the *National Post*). The focus of the article was a recent set of break-ins at the University of Victoria, which Weaver speculated were targeting climate scientists in an attempt to discredit or intimidate them (the break-ins occurred shortly after stolen e-mails between members of the University of East Anglia's Climate Research Unit and other climate scientists were released to the public). Foster claimed that Weaver blamed the fossil fuel industry for the break-ins, and called on him to produce evidence for the allegations, though Weaver had never made any such accusation. Foster then sarcastically tried to draw a parallel between

Weaver's flimsy evidence for his allegations and his apparent without-basis belief in anthropogenic climate change. The following day, Corcoran wrote another piece about Weaver, repeating the false claim that he was "publicly blaming the oil industry for the break-in at his office," and ridiculed Weaver after it was revealed that there had in fact been multiple break-ins in various buildings at the University of Victoria campus, suggesting that Weaver's office was not intentionally targeted (Corcoran 2009).

The following month the *National Post* wrote a front-page story incorrectly suggesting that Weaver was leaving the IPCC and wrongly claimed he was calling for "the replacement of IPCC leadership" and "institutional reform." It went on to again falsely state that Weaver had concocted a "cockamamie" story that the fossil fuel industry was responsible for the break-ins to his office. The piece accused the IPCC of fraud, manipulation, and distortion, and implied Weaver's agreement with this accusation was the cause of his alleged departure from the IPCC (Corcoran 2010). Finally, a few days later the *Post* ran another editorial claiming Weaver's "accusations" about the break-ins into his office were meant to distract from the attention being given to "climategate." It further went on to claim that Weaver's career was dependent on "global warming panic," and implied that Weaver helped manufacture such panic for financial gain. Overall, the attacks in the *National Post* can be interpreted as an attempt to convey Weaver as incompetent, dishonest, fraudulent, and manipulative. In response to these attacks, Weaver contacted the *National Post* asking them to retract various false statements. The *Post* refused, and Weaver ended up suing them for libel. The case is still pending (Littlemore 2010).

Almost a year later in an editorial written for the *Canada Free Press*, an online conservative tabloid, Timothy Ball, an emeritus geography professor from the University of Winnipeg, repeated the false claims first printed in the *Post* about Weaver leaving and criticising the IPCC.[2] Ball also implied that Weaver had bribed grad students with research funding in order to secure personal financial benefits from further government funding, and refused to debate in public out of fear that it would expose his incompetence. Overall, Ball conveyed Weaver as intellectually deceitful, lacking in expertise, and corrupt. He flatly conjectured that Weaver "knew very little about climate." After being contacted by Weaver, the *Canada Free Press* promptly removed Ball's piece from its website, and issued a public retraction and apology. Ball offered no personal apology or retraction, and was subsequently also sued for libel by Weaver. The case is also still pending.[3]

[2] The original piece has since been removed by the *Canada Free Press*, but their subsequent retraction and apology (which is also unable to be found on the *Canada Free Press* website) can be found here: "Andrew Weaver Wins One Against Canada Free Press, No News on National Post Libel Case," *Carbon Fixated* (blog), January 21st, 2011, http://carbonfixated.com/andrew-weaver-wins-one-against-canada-free-press-no-news-on-national-post-libel-case. Timothy Ball was also the focus of the above mentioned Charles Montgomery *Globe and Mail* article about Canadian climate change skeptics.

[3] Many of the details of the original piece can be found in Weaver's Statement of Claim regarding the lawsuit (Littlemore 2011)

Weaver receives so much attention from sources like the *National Post* because he has been a vocal critic of the perceived ineffectiveness of government policy, and has engaged in various advocacy and public-engagement activities. It might be worth noting that there is a classic asymmetry in the *National Post*'s treatment of climate change. Evidence of Weaver's deviance is not merely that he has engaged in political activities thereby transgressing scientific standards of neutrality and impartiality, since the *Post*'s editors do not consistently criticise the political activities of those scientists whose views they champion. The evidence of Weaver's transgression is simply that he believes that human-caused climate change is real. In the eyes of the *Post*'s editorial team, this belief is the contemptible political act that betrays the ideals of "objective" science. According to the *Post*'s view, the fact that is wholly taken for granted is that anthropogenic climate change is not real, and thus anyone denying this fact must have been compromised by political ideology, financial pursuits, or incompetence. The point will not be lost on STS scholars that others make similar (though arguably better substantiated) arguments about the beliefs about climate change sceptics and deniers (Oreskes and Conway 2010).

Overall, these particular pieces, and the general editorial position on climate change of the *National Post*, offer little in the way of serious and substantial critiques surrounding the many concerns surrounding climate change or any other politically-complex socio-scientific issues. The criticisms of Weaver are mostly simple ad-hominem attacks, aimed to undermine his credibility and thereby indirectly bolster doubts about theories of anthropogenic climate change. Above all else, Weaver's being singled out is chiefly a function of his effectiveness; the public was listening to what he had to say. This is the risk that attends any activist. The more effective one is at promoting their cause, the more they will receive unwanted attention, regardless of how reasonable, well-intentioned, or fair their position.

Activist scientists are particularly vulnerable to dismissive critiques, since the ethos of activism is assumed to be antithetical to the ethos of science. And to the small extent there are any substantive arguments being offered by the *Post*, they revolve around (in this case, incoherently applied) rules of scientific propriety. In short, the ostensible issue at hand is a classic one: to what extent do political or financial interests influence, or corrupt, science? However, given that many STS analysts will object to the framing of this question, since, arguably all science is political, the more interesting sociological inquiry would be to understand the ways that concerns about political interference and scientific propriety shape scientific practice. And for activist scientists a more productive question is: how can scientists best navigate public controversies?

Historical Lessons from Ecology

Various researchers have remarked that in the decades following Second World War, science came to occupy, in various ways, a much more public and political role. While the reasons for this shift are complex (and the extent of this shift is also

debatable), commentators often point to two prominent factors: First, the increased scrutiny and demands for accountability of scientists working in military capacities, which stemmed from reflections on the development of nuclear weaponry; second, a related development, the emergence of the environmental movement (Kasperson et al. 1980, pp. 11–23). Books like Rachel Carson's *Silent Spring*, Barry Commoner's *Nature, Man, and Technology*, and Paul Ehrlich's *The Population Bomb* were symbolic of the new public and political roles demanded of and taken on by scientists (it is less than a coincidence that STS, with its critiques of traditional conceptions of the politically neutral nature of scientific knowledge, began to emerge alongside these developments). Dorothy Nelkin explored these changes in an early science studies paper considering the ways in which public and political demands for ecological knowledge affected the professional activities of American ecologists (Nelkin 1977). While many ecologists and ecologically-minded scientists (typically, various kinds of biologists) welcomed or embraced their newfound public and political import, or were even actively engaged in cultivating it, others found the attention disconcerting.

Operating under an assumption that politics was an "alien element, essentially destructive of scientific endeavour," or at the very least a potentially dangerous element, ecologists attempted to more strictly define what constituted ethical ecological practice, especially insofar as public or governmental consultations were involved (Haberer 1969, cited in Nelkin 1977, p. 81). Certainly, a large part of these moves were largely for professional protection. Consulting firms and think-tanks proliferated, some based on suspect-credentials, to capitalize on the public and governmental demand (and research grants and consulting fees) for expert ecological knowledge. In 1974, there were 1,130 private consulting firms actively working on environmental issues (Nelkin 1977, p. 81). Ecologists lacked any sort of governing body that offered professional certification, and many feared that the emergence of these so-called "instant experts" would jeopardize the legitimacy of professional and academic ecologists, or perhaps even pose as competitors in the market for expert knowledge.

But behind these issues of professionalization lay more fundamental concerns about the proper role of scientists, about the inherent conflict between politics and science, and the constitution of scientific knowledge and practice. Ecologists were being recruited by various groups, from environmental activist organizations like the then-fledgling Greenpeace, to various federal American agencies operating under the recently established National Environmental Policy Act, to a multitude of industrial corporations looking for scientific assessments of their environmental impacts.

Most ecologists accepted that ecology was an inevitably politically-entrenched science. It was integral to directing environmental policy, something many ecologists felt was of paramount importance. Ecology did not seem to have the luxury of feigning impartiality or neutrality. It was inescapably normative, insofar as it constituted an integral component of considerations of how to best organize the relationship between humans and their environments. This is why Paul Sears called ecology a "subversive science." It had the power to challenge the "assumptions and

practices of modern societies, whatever their doctrinal commitments" (Sears 1964, p. 11). However, in order to meaningfully, sincerely, and honestly make these challenges, it needed to maintain certain standards of scientific knowledge. And so came the boundary making. An internal-external divide was erected, meant to protect the integrity and credibility of ecologists. This divide not only followed classical boundaries, protecting questions and principles supposedly internal to scientific practice, such as hypotheses, methodologies, and theoretical frameworks, from external influences like vested ideological or industrial interests, but also concerned the proper locale of ecologists' activities. Many ecologists were wary of working directly for corporations, since there were few guarantees about how their work would be used or presented, but sometimes felt that such arrangements might put them in a better position to influence change and have their voices heard. The dilemma was whether to operate "inside the system in hopes of preventing destructive decisions, or to remain outside, relatively powerless but at least maintaining integrity" (Nelkin 1977, p. 83).

Additionally, there were deeper concerns about the overall effect of policy-driven research on the character of ecological scholarship. First, there was a concern that ecological research was being conducted outside of the established parameters of scientific research, especially in consultation arrangements. Studies would be published by private consulting firms, or by industry-contracted scientists, that did not go through peer-review, but were nonetheless being considered in policy discussions. Furthermore, even the research that did meet peer-review criteria, was largely conducted ad-hoc for the purposes of short-term exigencies, like measuring pollutants. The result was that basic research was being marginalized, and little work was being done to establish fundamental ecological theories with predictive value, which was widely seen as necessary for establishing the long-term viability and credibility of ecology.

It was not just threats from the most egregious misappropriators of scientific credibility, or those employing the authority of ecology for disreputable or misleading ends, that were the cause of consternation among scientists and heightened boundary-work. While many ecologists were deeply sympathetic to, or even active in, projects for environmental protection and sustainability, they had at times uneasy relationships with citizen environmental groups, and worried about the effects this would have on their credibility as scientists. Just as the likes of Rachel Carson in the midst of the environmental movement were called "eco-doomsters," today scientists like Weaver are pejoratively dismissed as "alarmists." Carson's approach and positions were vehemently attacked, even at times by ecologists sympathetic to the environmental movement. Her scientific credibility was frequently the focus of such critiques. Biologist Ira Baldwin, though similarly concerned about the health risks associated with pesticides, took to the pages of *Science* to critique the "dramatically written emotional appeal" of *Silent Spring*, and urged concerned citizens instead to consult the "careful study" and "sound judgement based on facts" to be found in the National Academy of Science reports on pesticides (Hecht 2011, p. 292). Weaver has taken such threats to credibility to heart, professing at the onset of *Keeping Our Cool*, that he would not "sensationalize [climate] science with outlandish claims of apocalyptic proportions" (Weaver 2008, p. 27).

However, despite these risks, the historical case of ecology demonstrates that the contextual demands of activism and advocacy prove inescapable, even for the most ostensibly apolitical scientists. These demands emerge from the exigencies of societal concerns in which certain kinds of expert knowledge are more implicated than others. Just as the public role demanded of ecologists was seen as unavoidable, climate scientists find themselves deeply implicated in public debates, whether they would pursue them or not.

A View from the Front Lines

As a part of a larger project exploring the relationship between scientists' interaction with the media and their research practices, I interviewed a climate scientist who had found himself occasionally called upon as an expert authority for media stories, despite making no concerted effort to pursue such relationships. His thoughts offer valuable insights into the dynamics of science popularization and public engagement, boundary work, and the conflicting ethical or normative demands encountered by scientists.

As various critics have noted, "[activist groups] who need scientific expertise do not necessarily share scientific values" (Nelkin 1977, p. 83; Latour 2004; Giddens 2011). Indeed, various activist or advocacy groups do not necessarily even share the same social values as activist scientists. For those holding or producing expert knowledge in high public demand, the threat of misappropriation is a persistent concern. Like the ecologists who were wary of the surge of non-peer-reviewed research that was able to proliferate because of increased public and political demand, my interviewee also worried about the effect that climate change debates were having on established means of making a scientific argument:

> If you want to make a scientific argument, the way to do it is to publish a paper in a peer reviewed scientific journal. That's the way that science works in every single field, the peer review system, you just don't take people seriously unless they're willing to submit to peer review. For most science, peer review works pretty well – it may take a few years, and things will get published that are wrong and have to get corrected. If you want to engage in that debate you have to step into the arena and argue in that way. You just can't sit by the sidelines and throw stones. You know, scientists find it incredible that anybody would be taken seriously that wouldn't publish serious articles, but of course, the press doesn't make a distinction.

Even more of a concern was that activism or advocacy presented a threat to images of credibility. The possibility of disparaging personal critiques, or, more importantly, the danger of causing reputational damage to the community of climate scientists were causes for serious apprehension in deciding whether or not to interact with the media or pursue public engagement activities. He believed that such activities were often cited as evidence in "coverage of climate science from the skeptics, or from the *National Post*" to present an "image of climate scientists as this club that just wants to fund themselves [or are] going for the limelight."

However, my interviewee felt that the credibility of science was inherently self-regulating. Scientists who spent inordinate amounts of time in popularization activities, or those that inflated their credentials to capitalize on policy interests in climate were "never taken as seriously by the rest of the community, anyway. Typically, [their work] tends to be kind of flashy, or the phrase we tend to use for that kind of science is 'quick and dirty.'"

Despite these concerns, like the ecologists in the midst of the environmental movement, my interviewee felt that there was a common sentiment among the community of climate scientists that they had an obligation to speak up if they saw their knowledge was of pressing public interest. The question was not whether scientists should engage in advocacy, but how, and "how much":

> I don't think you can tell scientists to stop being activists; that would be crazy. Scientists are also human beings and citizens and if they feel that people aren't taking the science seriously enough, they're going to say something. [. . .] Some believe that there's a crisis – that we're just heading towards a cliff – and they feel that they just have to speak out. So, I think there's the well-intentioned advocate who crosses the line, because they just feel that they have to."

For my interviewee, while "crossing the line into advocacy" was perfectly admissible, it was imperative that the line remain as clear and distinct as possible. Science involves "conducting sober analyses" and "proving things to a very high level of confidence," but one has to "be able to somehow separate the advocacy role from the sober reports which do not get into advocacy."

Our conversation did not turn to exploring what my interviewee saw as the fundamental basis for establishing the essential divisions demarcating sober scientific analysis from advocacy. Much work in STS and the philosophy of science has been done to problematize attempts to establish this division in some internal logic of scientific knowledge (e.g., Barnes 1974; Shapin 1992). The majority of discussion about internalism-externalism in early STS focussed on the analytical legitimacy of this categorical division, that is, how useful is it in explaining historical and sociological developments of scientific knowledge. Much of this work was philosophically tinged, implicitly (or at times explicitly) weighing in on normative questions surrounding rules of scientific discovery. Despite claims to impartiality and analytical distance from the categories of sociological actors, this supposedly descriptive work often contained implied prescriptive critiques of the conceptual ordering devices of scientists. That is to say, my interviewee's desire for clear demarcations between science and advocacy might be implicitly rejected as conveying a philosophically dubious notion of science. However, again in the name of impartiality, STS scholars would often absolve themselves from the reconstructive task of imagining productive and useful boundary-making. In recent years there have been various encouraging exceptions (Lahsen 2005).

For what it's worth, it is doubtful that my interviewee supposed that the demarcation between science and activism followed any neat rubric, as he admitted that establishing this distinction was a constant challenge: "You have to be able to *somehow* separate the advocacy role from the sober reports which do not get into advocacy [. . .] I think the only answer I would give is that *somehow* people have

to be able to wear two different hats and maybe separate those hats." What is clearer is that for my interviewee, boundary-making served an important pragmatic function.

The "internal" integrity of scientific research is part and parcel of broader concerns about expert credibility. Furthermore, the integrity of the "sober analyses" and the credibility of scientists are crucial for achieving the aims of advocacy and activism. Indeed, the effectiveness of the latter is seen as wholly dependent on maintaining a clear and distinct boundary from the former. Thus, for my interviewee the ethical responsibility incumbent on scientists does not necessarily open up the possibility of more porous boundaries between science and activism, nor indeed challenge those boundaries. Instead, demarcations are of paramount importance in maintaining scientific credibility, upon which depends effective advocacy and activism.

All Science Is Political, but Politics Are Complicated

It is in the separation between questions of sober scientific analysis and activism that lies my interviewee's hope for "science-based advocacy." Criticisms from STS hold such separations to be social constructions, not inherent to the nature of either science or politics. In practice, policy rarely flows directly from "sober scientific analyses." There are innumerable border crossings, and indeed, acts of construction are intractably political. But, for my interviewee this is precisely why political acts and social constructions are so integral to maintaining the credibility that ultimately allows for meaningful advocacy.

Thomas Gieryn argues that such boundary work is largely rhetorical, and he chiefly places the rhetorical force of science in the purview of scientists. The image of science cultivated by scientists functions at least in part to establish credibility of certain kinds of expert knowledge. A simplistic conclusion of these arguments is that science isn't "really" value-free, or objective, or politically neutral, but these are rather things that scientists say about science so as to bolster the authority of their knowledge claims. But, of course, such rhetoric is only effective if the public values such conceptions of science.

The intensely discussed "climategate" is revealing here. Though typically intemperate, the *National Post* captured much of the public sentiment concerning this incident, claiming it revealed the scientists involved to be "intensely preoccupied with politics" and "perpetrators of fraud." Most STS scholars found the episode rather unremarkable, since decades of historical and sociological studies have made STS scholars acutely familiar with the conclusion borne out by the "climategate" episode, namely that "scientists are not infallible and that they can be idiosyncratic and petty" (*Toronto Star*, August 31, 2010; see also Ryghaug and Skjolsvold 2010). Moreover, based on these constructivist conceptions of science, most STS scholars do not expect scientists or science to be politically neutral. But publics often do, or

at least they expect scientists to aspire to certain ideals. "Climategate" would not have been so intensely discussed otherwise (see Boykoff 2011).[4]

Some will tie public expectations for ideals like political neutrality in science into broader rhetorical strategies. They are simply a result of the self-reinforcing authority of science. It is rhetorical through and through. But, again, there are largely unexplored normative consequences to these kinds of conceptions. Most importantly, to challenge conceptions of political neutrality as socially constructed is to imply that scientists are wrong to think like this. The public is also wrong to think like this. In some sense they have been "fooled," by the rhetorical success of scientific experts and others who have a vested interest in maintaining the cultural authority of science. This poses challenging questions for reconstructive or activist STS, most notably, how to reconcile critical STS perspectives with democratic ideals. Engaged STS has traditionally encouraged democratic public engagement in cases where publics have been marginalized, or these publics' conceptions of science are congruous with STS conceptions of science (Wynne 1992). But what about cases when the public's demands or conceptions of scinece are in conflict with lessons from STS? How can STS engage with publics it "disagrees" with?

Furthermore, while Gieryn and others are arguably correct about the rhetorical nature of scientific credibility, there is a risky tendency of thinking this means that it is "merely" rhetorical. This downplays the degree to which the "communication end" of science is based on the "production end." Rhetorical credibility is predicated on practices, institutions, epistemologies, and ethics. And rhetoric can have varying degrees of substance. Similarly, the realization that divisions between politics and science are not clearly delineated by some universal logic of scientific knowledge should not lead to the conclusion that such constructed boundaries are ineffective or unnecessary. Constructions and rhetoric are tied to not-inconsequential actions, and can facilitate or hinder not-inconsequential activisms.

The statement that "all science is political" is a common, but arguably tautologous, refrain. What constitutes something being "political" is so varied, it does not say very much in particular. Originally, the recognition that science is inescapably political was seen as a dangerous or subversive notion as it conflicted with longstanding ideals of political neutrality or impartiality. It helped expose rhetorical appeals to authority. And it can still lend itself to reconstructive STS to be enlisted for activist projects. But the symmetrical sociological analysis eventually masked the normative work being done, as well as hindered reconstructive possibilities. Symmetry may have inadvertently introduced a kind of moral equivalence. Not all science is political in the same ways. Just as Patrick Hamlett (2003, pp. 112–130) notes that the jump is very small from recognising that all science is socially constructed to imagining ways to reconstruct it, the recognition that all science is

[4] In the period from 2000 to 2010, "climategate" was most likely discussed more than any other issue surrounding climate change.

political is a liberating one. Acknowledging the inescapable political nature of scientific knowledge, the question then becomes, in what ways *should* science be political?

Science is mobilized in the name of particular interests, or in public debates, or for specific projects, all of which involve political boundary work and social constructions, and all of which are contingent and situated. Some mobilizations are desirable, others damaging. Some are likely, others latent, but none are inevitable. GMO research is not destined to be co-opted by dominating corporations, nuclear research is not destined to become a focal point of foreign policy and international relations, and climate change action is not destined to be stalled by *certain kinds* of politics. Thus, concerns about *certain kinds* of politicization of science are not unreasonable or naive. Notwithstanding intractable philosophical issues, and not forgetting the complex nuances of science revealed by constructivist analyses, science is at least in small part about producing useful and robust accounts of the world. The possibility that science can be co-opted for nefarious or selfish purposes is a real and persistent concern. Pharmaceutical companies downplay the risks of drugs, oil companies cover-up the extent of ecological disasters, and governments justify inaction on pressing environmental issues with the authority of scientists willing to be enlisted for these ends. The frequent inability of status-quo social, cultural, political, and economic systems to effect these ethical considerations is what compels science activism. This is what makes some constructions, some boundaries, some politics, more desirable than others.

Activism and Power

Edward Woodhouse and colleagues (2010) define activism as inherently grassroots, or at least, belonging to the domain of the relatively disenfranchised: "By the term 'activism,' we refer to a range of methods used by groups with relatively little institutional power attempting to influence opinion, policy or practice toward democratic and other normative ends" (pp. 297–319). The often not-explicitly-stated goal of many STS analyses of science has been to undermine the cultural authority of science, since this power is largely unjustified in that it is unanswerable to publics in democratic ways (Jasanoff 1990). How then, are we to understand activist scientists?

Massimiano Bucchi argues that deviations from traditional lines of science communication occur typically in crisis situations that demand unorthodox activities or the transgression of established boundaries. As my interviewee conveyed, this is precisely the chief motivation for scientists engaging in advocacy: they believe we are "heading off a cliff," and while perhaps not ideal, there is little alternative than to engage in advocacy. But the feeling of crisis not only stems from the severity and pressing nature of the problem of climate change, but also from the perception that official lines of action are failing. Contrary to the authoritative image of science presented in so much STS work, climate scientists find themselves

relatively powerless in the face of competing interests. Weaver and other climate scientists, while comparatively powerful and authoritative in relation to the others compelled to take action on climate change, cannot, even with their influence, sufficiently compel governing bodies to take climate change seriously. Generalizations about the authority of science are thus not particularly helpful here. Some science and scientists have immense, and arguably unjustified, social, political, and economic authority. Others are relatively powerless. Contra Gieryn, the authority is not chiefly rhetorical; it is dependent on various social, political, and economic assemblages. Scientific knowledge can be marginalised if it poses a threat to powerful interests. Is climate change a case in which scientists have too little power, not too much?

However, power differentials cannot in themselves be a standard which determines what interests to rally behind, though questions of power have proved to be a pervasive and seductive starting point for discussions of the relationship between ethics and expertise. What if things were actually how climate sceptics imagined? That sceptical voices were being silenced in the name of powerful environmental activists, with vested economic and social interests that were served by the authoritative claims of climate scientists? Here we perhaps run up against the limits of symmetry since climate sceptics argue their case along similar lines as so many STS critiques of the excessive and co-opted cultural authority of science. According to sceptics the activities of powerful institutions like the IPCC are socially unjust: they promise to stall economic development, cost jobs, unfairly re-distribute wealth, and ultimately hinder human well-being and prosperity. Of course, this is not to say that sociological analysis is not immensely valuable. Symmetrical methodologies need not substantiate symmetrical conclusions. This is the whole point of recognizing that while both climate activists and climate sceptics are engaged in politics, some politics better promote "more democratic, environmentally sustainable, socially just, or otherwise preferable civilizations" (Woodhouse et al. 2010, p. 298).

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