Controversy Studies

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Abstract

Controversy studies have been an important part of the sociology of science since the late 1970s when Merton's more institutional approach to the field began to be displaced by the sociology of scientific knowledge (SSK). Inspired by Fleck, the new sociologists of science were determined to show empirically that knowledge-making was a social process involving struggles between old and new ideas. Controversy studies focused on such moments. Two broad streams of research emerged under this heading. The first investigated conflicts over the interpretation of particular observations of natural and social phenomena, giving rise to the methodological concept of symmetry in SSK: that sociologists should use the same explanatory tools to explain why some facts are accepted as true and others rejected as false. The second focused more on wholesale shifts between what Kuhn termed scientific paradigms. Here research encompassed the makers and users of knowledge along with the interpretive flexibility of the observations themselves. This research looked at the formation of thought collectives and forms of expertise associated with the definition and control of new knowledge objects.

Keywords: expertise; Fleck, Ludwik; Kuhn, Thomas; science; scientific method; technology

The founders of the sociology of knowledge initially excluded science from their roster of social phenomena needing further analysis. Traditionally seen as the domain of facts and established truths, science at first seemed an unpromising home for sociology. Conflict is supposed to end when facts are securely established, and science was widely seen as humanity's pre-eminent instrument for taking debates out of the social arena into the domain of uncontested facts. However, beginning in the 1970s, scholars discovered that the conduct of science is riddled with disagreement and that the stakes involved in settling disputes go far beyond testing the truth or falsity of scientific propositions against nature's reality. Scientific controversies provided an unexpectedly informative window on the dynamics of society, and controversy studies became a fertile starting point for the development of the sociology of science and science and technology studies (STS). Indeed, close investigation of scientific disputes turned out to be so productive of more general insights into social mobilization and the deployment of power that controversy studies gained a secure foothold in the methodological repertoire of sociology. As with most highly generative methods, however, this genre of work covers a wide terrain, with significant variation in both its theoretical presuppositions and the choice of research sites and topics of analysis.

Controversy studies can be broadly divided into two types: first, contestation within scientific and technical communities, preceding and leading to the settlement of facts and related disputes over technological feasibility and design; and, second, contestation over broader social or political issues whose resolution turns to some extent on the determination of scientific and technical facts. Both kinds of studies focus on events during which social actors express their differences and seek to advance their goals by challenging each other's knowledge claims. Such moments allow analysts to observe how actors tease out and seek to overcome contingencies in the making of scientific knowledge and technological systems. In reverse, controversy studies also shed light on the social and cultural assumptions that enter into the stabilization – or black boxing – of facts and artifacts, particularly when the resolution of such conflicts has significant bearing on law, policy, or other repertoires of collective action.

Interest in the first type of controversy studies began with the emergence of the sociology of scientific knowledge (SSK) as a research program in Edinburgh in the mid-1970s. Labeled the "strong programme" (Bloor, 1976), this approach famously urged researchers to adopt a posture of methodological symmetry in investigating controversies. Symmetry in SSK meant not presuming in advance that either side had the right answer, nor that conflicts ended because the nature of reality supported the side that won. SSK scholars noted that exclusive attention to the "sociology of error," that is, why some groups hold wrong beliefs, may mask the social dynamics that account for the cessation of controversy. More insight is to be gained by not assuming in advance which side held the false belief. Extending this method to technological systems, constructivist scholars showed that interpretive flexibility – the indeterminacy of knowledge and hence the possibility of interpreting signals from the world in multiple ways – is equally prevalent in designing technologies. Settling on one technological design over another results from negotiations among user groups with competing needs and interests rather than from the intrinsic properties of inanimate materials (Bijker, Pinch, and Hughes, 1987; Bijker, 1995).

The constructivist position on how controversies end gained its crispest articulation in the rules of method propounded by Latour (1987: 258), who asserted that neither nature nor society should be advanced as *causes* for the settlement of controversy: rather, stability in each is the *result* of settling the controversy. Only when a controversy ends can one be certain what the facts are and who was authorized to declare them. Unlike SSK, however, actor-network theory (ANT), as developed by Callon and Latour in Paris during the 1980s, insisted that not only human actors but also the nonhumans they bring into their scientific work belong in any comprehensive sociology of knowledge (Callon, 1986). In the ANT framework, symmetry means acknowledging that nonhuman "actants" have agency as much as human actors do, and sociology must take on board the network of associations between actors and actants (Latour, 2005). Controversies end, on this account, when a given network enrolls enough actors and actants to render any rival network powerless to assert comparable authority or control.

The methodological prescriptions of SSK and ANT were widely misinterpreted as ontological claims about the facts and artifacts of the natural world – equivalent to insisting that no fact is truer to nature than any other, and denying that materials, too, have hard and fast qualities that humans cannot manipulate. Those charges turned controversy studies themselves into an object of controversy. Critics asserted that, in adopting symmetry as a method, STS had espoused epistemic relativism, and hence offered no criteria for distinguishing between better and worse, or even true and false, scientific claims. These accusations came to a head in the so-called science wars of the 1990s (Gross and Levitt, 1994; Sokal and Bricmont, 1998) and prompted a rethinking of controversy studies by some prominent contributors to the field. On the defensive, these scholars felt a need to redeem a line of work that they felt had been too easily co-opted by dissidents from the reigning scientific consensus, even when science was reliable and salient, as with the growing knowledge of human-made climate change.

Expertise provided one way out of the problem of relativism. Better science, some argued, is science attested to by experts in a field, who are also identifiable as such – a worthy task for sociology. Collins and Evans (2007) suggested that, in any scientific field, legitimate expertise can be classified in the form of a "periodic table" based on the tacit knowledge of those skilled in that field. By implication, only those possessing the right kinds of knowledge as represented in such a table have the authority to resolve a controversy within their domain. Others stressed consensus among experts as the most significant criterion for distinguishing good from bad claims. A strong consensus means that those most knowledgeable about a given field no longer find reasons to disagree; lay observers lacking relevant knowledge or skills should simply defer to the expert consensus on such matters. Still others argued, repudiating SSK's symmetry principle, that what needs explanation is not how scientists come to agree on matters of fact, but why society is unwilling at times to accept the prevailing expert consensus. One popular answer was that powerful interest groups fund the production of tainted science to sow doubt where none should have existed (Oreskes and Conway, 2010). A variant of this argument traced the systematic production of ignorance, or "agnotology" (Proctor and Schiebinger, 2008), back to group interests, noting cases in which actors with money and influence purposefully blocked research on matters where more knowledge could have ameliorated social problems.

Other writers were less concerned with episodic controversies over facts and more interested in the displacement of once settled belief systems by unfamiliar and disputed ideas. Sociological attention focused on how subjectivities evolve as people become more attuned to seeing new representations of the world as normal and come to accept ideas they might once have rejected as too controversial. This line of analysis began with Fleck's (1979 [1935]) classic study of the shifting causal paradigm for syphilis, which attributed the establishment of new scientific facts to the development of receptive "thought collectives" with distinctive "thought styles." To understand how conflicts between older and newer ways of thinking are resolved, it is not enough to dwell, as early SSK scholars did, only on the social and political interests of the actors, but also on their subjective relationships with each other and the materials they interact with. Thus, new technologies may spur changes in perceptions of the world, leading to the formation of collectives, as when the development of the synthesizer prompted a revolution in the sounds and practices of music (Pinch and Trocco, 2002). The emergence of climate science, not merely as a field of study, but as a novel and controversial way of reinterpreting meteorological data, illustrates how such comprehensive reorganizations of knowledge, and of knowledge makers, require complex infrastructures of interlocking machines, models, and institutions to sustain them (Edwards, 2010). Similarly, the rise of genomics as a regime for rethinking fundamental biological questions went hand in hand with the emergence of a new class of scientific actors with the rights, duties, and capabilities to control the "knowledge objects" that were brought into view through the sequencing of the human genome (Hilgartner, 2017).

Broad perspectival shifts of these kinds, in how to hear, see, and interpret the state of the world, necessitate the formation of new groups of authorized hearers, seers, and interpreters. Expertise, in short, does not simply follow the delineation of a distinct field of study, but is coproduced (Jasanoff, 2004) along with the struggles that mark the establishment of such fields and their associated norms of good practice or epistemic virtue (Shapin, 1994; Daston and Galison, 2007). Among the powers that experts bring to the closure of controversies is that of setting standards in their respective fields. Standards constitute part of the normative infrastructure of dispute resolution, demarcating good from bad practice and creating expectations of proper behavior on the part of users, along with uniformity in the characteristics of the objects being standardized (Busch, 2011).

The second major strand of controversy studies encompasses social controversies that include contestation over the validity of technical claims whose resolution would solve quandaries over how people should act. These studies originated with the observation that social conflicts involving health, safety, environment, education, or development, as well as controversies arising in the context of war and mass violence, often translate into battles among experts making disparate claims about the interpretation of technical information. How and why, researchers asked, do such factual disputes originate, and what, if any, explanations can be provided for why they end. A common answer, paralleling the work of SSK scholars, was that public scientific controversies reflect underlying interest conflicts (Nelkin, 1979). They are often provoked when one social group's plans to move forward with a novel scientific or technological project collides with another's interest in maintaining the status quo. Although this explanation says nothing on its face about power relationships, investigators noted that in practice it is often the socially dominant group that is empowered to assert its views, and the more marginal group that is forced to question the facts and reasoning afforded by those closer to the mainstream (Scott, Richards, and Martin, 1990). Hence, attempts to destabilize the scientific consensus are not intrinsically good or bad. When driven by valid social objectives, such as greater inclusion, efforts to upset the expert consensus can be valorized as progressive and desirable, as when people with HIV-AIDS fought successfully to loosen the rules by which US federal agencies conducted clinical research on new drugs (Epstein, 1996).

These accounts of socially salient epistemic controversies initially paid little attention to the diverse institutional and cultural contexts within which disputes originate and are resolved. A third perspective on symmetry gained ground in the 2000s, arguing that the dynamics of controversy must take into account not only the epistemic and material dimensions of such disputes, but also the normative stakes involved in ending them (Jasanoff, 2005). Nowhere is the intimate connection between epistemic and normative closure more apparent than in legal settings, and the law maintains its own rules for determining what counts as legitimate expertise and how cases should be decided when facts remain indeterminate. In delving into legal disputes, students of knowledge controversies called attention to the law's role in certifying new domains of expertise, such as fingerprinting (Cole, 2001), handwriting identification (Mnookin, 2001), or DNA fingerprinting (Aronson, 2007), and in standardizing technical practices (Lynch *et al.*, 2008). Critics, however, charged that courts are too prone to accepting scientifically invalid expert claims at the expense of legitimate science, such as the discredited sciences of eyewitnessing (Loftus, 1996 [1979]) and repressed memory (Loftus and Ketcham, 1996). Courts, especially in the United States, were routinely attacked as repositories of "junk science," sustained by the technical illiteracy of judges and jurors, although others cautioned that such simple characterizations reinscribe structures of power that tend to marginalize the already marginal. Legal processes can be seen as an arena in which societies selectively draw on expertise to satisfy the need for moral closure. The solidity and reliability of the evidence may then take second place to such normative demands as the validation of identity and memory (Hacking, 1998; Wagner, 2008). More profoundly, as theaters of public reason, courts can determine which discourses are appropriate for the resolution of disputes, signaling in particular where expert input is a necessity and where lay framings and interpretations may be allowed to dominate (Hurlbut, 2017).

Cultural contexts matter in still more fundamental ways in the framing and resolution of controversies. Claims seen as beyond contestation in some societies, such as the theory of evolution or the human origins of climate change, are regarded as debatable hypotheses in others. In some political cultures, expert judgment is deemed sufficient to uphold policy-relevant claims, whereas in others reliability can be secured only through neutral, mathematical discourses, such as statistics and risk assessment (Porter, 1995). Arguments seen as purely technical in some contexts, and hence as suitable for resolution by experts, are unpacked in others as having a normative dimension, requiring wider deliberation (Parthasarathy, 2017). Such observations of cross-cultural difference have prompted greater interest in supplementing older sociologies of knowledge-making with sociologies of reception, taking into account the interactions between citizens and ruling authorities that give rise to distinctive "civic epistemologies" (Jasanoff, 2005).

Overall, the field of controversy studies has expanded far beyond its early focus on factual disputes of principal concern to competing expert communities. In asking how the certification of knowledge matters to the resolution of broad social struggles, controversy studies have won a permanent place in sociology's methodological canon. Neither the field's subject matter nor its approaches to addressing it are likely to diminish in significance in coming decades.

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