

SOCIOTECHNICAL CONTROVERSIES

Authors and date

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WHY STUDY CONTROVERSIES

Giving the public a glimpse of the victory of a great man¹ and his theory: this has long been the purpose of the "controversy", a term used to designate the staging of scholarly disputes embodied by illustrious protagonists. By providing an overview of the subjects under discussion, controversies helped to expose a scientific dispute and legitimize its resolution. They popularized scientific knowledge and told the story of their elaboration.

Today, this narrative process seems obsolete, even inappropriate, in the face of situations of uncertainty - of environmental, health or technological origin - in which citizens are placed without scientific knowledge allowing them to easily decide. The irruption of the Covid-19 (but we can think of the 5G) shows, not without raising astonishment, the relatively long time that sciences need to understand, to prove and to convince. As controversies proliferate and change in nature, making collective action difficult, the social sciences are more useful than ever. By postulating that the production of knowledge is inseparable from the context in which it is constructed, they make the analysis of controversies a springboard for understanding and action. By basing it on the method of inquiry - which describes actors and authors, issues, arguments, evidence and debate arenas - they also make it a pedagogical tool, valuable for training today's and tomorrow's citizens in critical thinking.

Because it traces the network of relationships between the various protagonists, takes into account the multiple ways of delimiting and representing a problem, and allows one to find one's way through the "unknown land" that constitutes a controversy, this type of analysis is sometimes metaphorically called the "cartography" of controversies.

SCIENCE IN THE MAKING

In the 1930s, the philosopher Karl Popper identified the importance of dissensus in scientific activity. Using the principle of falsifiability, he made the refutation of an already established theory the main driving force of science. Well after him, from the 1970s onwards, the proponents of a sociological and anthropological approach to scientific knowledge, because they want to be attentive to science in the making² and privilege the circumstantial study of its practice and its experimental devices, document the role of controversies in the production of facts. These historians and sociologists of science thus name theoretical and

methodological oppositions that are specific to the production of scientific knowledge and make them a stage, a moment, in the process of the emergence of a valid statement.

To understand how the concept of controversy sheds light on the functioning of the most fundamental sciences, which are *a priori* remote from any social dynamics, let us follow more particularly the sociologist Harry Collins who, from the 1970s until the discovery of gravitational waves in 2015, conducted a field study among the community of high-energy physicists who were seeking to prove their existence³. A controversy had emerged in 1968, when physicist Joseph Weber claimed to have discovered gravitational waves with a new experimental system. His peers were unable to reproduce this result, even using his protocol, nor to prove that he had made a mistake. Collins explains that, on an innovative research front, one cannot rely on a result - not yet defined - to validate an experimental setup, nor on a rigorous scientific method - not yet established - to validate that result.

During his research, Collins invites scientists to talk about the experimental designs of their colleagues and competitors in interviews. He discovers the extent and virulence of their methodological and theoretical oppositions and also reveals criticisms with a social dimension, whether they are institutional (the trust placed in a university or a laboratory), relational (linked to charisma, for example) or related to xenophobia or misogyny. In short, a world made of humans, whose interactions constitute an object of study for sociology.

For Collins, the controversy is thus a moment of confrontation of methods and of more or less civilized dialogue, a stage participating in the collective construction of a scientific fact, obtained when a community reaches a consensus. According to him, the study of controversies is fruitful from an epistemological point of view - and for some sociologists of science⁴, it should be limited to this claim.

WHEN CONTROVERSY BECOMES CONTROVERSY

For other sociologists, on the contrary, a controversy cannot be reduced to the universe of scientific research. Cyril Lemieux⁵, for example, sees it as a scientific quarrel, which he describes as a triadic conflict (two opposing parties and a public of peers who judge), but he adds the possibility of a process of "deconfinement of the controversy" as soon as one of the actors involved tries to mobilize other forces (social, economic) to prevail.

Following other authors⁶, we think that the study of proof devices in society deserves a singular and more supported attention. Yannick Barthe⁷ relates how veterans of the French army, deployed in the Sahara during the 1960s and in Polynesia in 1996, sought to demonstrate that they suffered from exposure to radiation during nuclear tests. The epidemiological proof of their endangerment, which would have consisted in comparing the prevalence of thyroid cancer among the group of exposed soldiers, in relation to their age group, was impossible to provide without the help of the State in gathering a list of the personnel present in the area at the time. However, it was precisely the State that was targeted by their complaint. In order to have a chance of establishing proof, they had to make their cause known and thus reach new audiences by joining their voices to those of other groups with whom they had complex relations (indigenous victims of the tests, anti-

nuclear pacifist and environmental activists). They eventually obtained recognition of their damage and a bonus. In spite of a biased evidence system (only those who saw an interest in it came to them: other sick veterans), the elaboration of a causal link between exposure to nuclear tests and the cancers developed by veterans, and their capacity to bring about a social mobilization, are here inseparable and of the same nature. We find today the same process and debates around the health effects, far from being clear-cut, of the 5G.

The arguments to be analyzed are based on an interweaving of scientific, technical, social, political and economic dimensions, without it being possible to establish simple causality or to isolate one aspect. The study of a controversy confronted with such subtle and complex interrelations cannot therefore be reduced to thinking of the production of knowledge as coming from the closed universe of research: it is interested in the evidence in society.

Controversy, as we have understood, is controversial⁸. First of all, because it is not so much a predefined form of the repertoire of social debates as the result of mobilizations⁹ and because it is itself an object of debate: often, its very existence is not agreed upon. For some actors, for example, to qualify a disagreement as a controversy would be to legitimize a doubt, whereas they often feel that they are only confronted with fantasies or slander. Even within the social sciences, where the notion is associated with a current of research in the sociology of science - that of the actor-network theory promoted by Madeleine Akrich, Michel Callon and Bruno Latour in particular - defining a controversy poses a problem. Precisely because we are attentive to the plurality of voices in a controversy¹⁰, we do not claim here to settle a definitional or methodological debate in sociology. But we want to testify to its fruitfulness as a device for initiating the study of the interrelations between science, technology and society, by looking at hot topics.

CONTROVERSIES: INSTRUCTIONS FOR USE

We are going to give an operational definition of controversies, or, when confronted with them, to direct our gaze towards the essential dimensions that allow us to grasp the stakes and the process. Sociologists Nicolas Benvegna, from the Médialab at Sciences Po, and Brice Laurent, from the Center for the Sociology of Innovation at the École des mines, have, in the course of their teaching, developed the following definition, which has served as the basis for many training courses in the analysis of controversies:

A controversy is a situation (1) in which a dispute/disagreement (2) between several parties (3) - each party engaging specialized knowledge (4) and none of them succeeding in imposing certainties (5) - is staged before a third party (6). A controversy is characterized by a tangle of various stakes, facts and values (7) as well as by the fact that a definition of the technical and the social is simultaneously at stake (8).¹¹

- Situation (1): this term opens the cartographic metaphor frequently used in the analysis of controversies. In the framework of the investigation, we produce a state of affairs, that is to say, we give an account of the way in which positions are established and arranged at a moment t . The situation is understood as a configuration at a given moment, it is subject to dynamics and results from a trajectory.

- Dispute (2): the term implies the existence of a relationship between positions (a conflict is a relationship), in the sense that they respond to each other. Thus, one can consider that in the case of absolute watertightness between the positions of the actors in the formulation of their positions, the controversy cannot be constituted - the controversy supposes a kind of ballistics.
- Several parties (3): in theory, two parties are enough to create a controversy, but most often today, the parties are multiple and of very varied natures, individual or collective: researchers, experts, representatives of associations, activists, politicians, etc. The only discriminating criterion is the public contribution of each party to support a position. *The actor* always speaks in his own name - vague categories such as "civil society" or "politicians" are discarded. A statement must always be situated, in reference to a source. Actors are said to be mobilized in the sense that they participate in the definition of what is problematic, and this is often one of the points of disagreement.
- Specialized knowledge (4): controversies always concern the production of knowledge and involve specialized knowledge. This is what distinguishes them from a polemic, a public problem or a moral dilemma. The term "specialized knowledge" takes into account the fact that scientists are not the only ones to produce it: there is also practical knowledge, sometimes tacit, linked for example to a profession or to the inscription in a territory. Such a perspective does not weaken the authority of scholars. It differs from a neo-scientist discourse which considers that the assertions of a scientist would be credible simply because of his title or his "quality", which would be worth an argument of authority. But by describing with finesse how expert and lay knowledge contribute reciprocally to the understanding of disputed issues, the methodology of controversy analysis makes the analysis of science more realistic.
- Inability to impose certainties (5): we speak of a certainty when a certain level of consensus around a scientific fact has been established, i.e. when knowledge has been stabilized. We must never lose sight of the fact that today there is a very large amount of stabilized knowledge, but that, by definition, the researcher is working to establish a fact and that this process often (but not always) takes the form of a controversy.
- Staged in front of a third party (6): the third party is of a very variable nature. It can be at least the peers within the scientific community or, for example, the journals in which the researchers publish within a disciplinary field. This third party sometimes refers to mobilized audiences, depending on the subject of the controversy. As for the staging, it corresponds to a way of framing the issues of the debate, notably during its mediatization.
- Entanglement of facts and values (7): *a minima*, we can say that a controversy is precisely the moment when the facts are not yet established and when the demarcation with the *values* has not taken place. There is a tendency to define values *a posteriori*, once the facts are in, which is not very realistic from the point of view of *science studies*. We must also remember that there is a multiplicity of facts of a great diversity of natures. Moreover, the term "fact" tends to cover all the steps that lead to it, whereas these steps themselves can constitute a chain of facts. Finally, a fact is nothing without the theory -

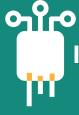
as example, manifestation, prototype, etc. -, nor the work of putting it into practice. Finally, a fact is nothing without the theory - as an example, a manifestation, a prototype, etc. -, nor the work of formatting - of coherence, of modelling, of ordering¹² - that accompanies it.

- Indeterminacy of the technical and the social (8): the studies of controversies have contributed to show how much the technical and the social are not domains in themselves, of which one could once and for all designate what belongs to them. A controversy is precisely a moment where the definition of technique, for example, is at stake¹³.

Thomas Tari¹⁴

SOURCES

1. Too few women in science have been honored in scholarly disputes. [←](#)
2. Bruno Latour, *La Science en action*, Paris, La Découverte, 2005^{m3}[1st ed. 1987, Harvard University Press^{m3}]. [←](#)
3. Harry Collins, "The Seven Sexes: A Study in the Sociology of a Phenomenon, or the Replication of Experiments in Physics." *Sociology*, 9 (2), 1975, pp. 205-224. [←](#)
4. Entretien avec Yves Gingras par Nicolas Chevassus-au-Louis, « Les controverses reflètent l'organisation de la science », *La Recherche*, 2013, p. 478; Yves Gingras (dir.), *Controverses. Accords et désaccords en sciences humaines et sociales*, Paris, CNRS Éditions, 2014. [←](#)
5. Cyril Lemieux, « À quoi sert l'analyse des controverses ? », *Mil neuf cent. Revue d'histoire intellectuelle*, 25 (1), 2007, p. 191-212. [←](#)
6. Andrew Barry, *Political Machines: Governing a Technological Society*, London, Bloomsbury Academic, 2001; Brian Wynne, "Misunderstood Misunderstanding: Social Identities and Public Uptake of Science," *Public Understanding of Science*, 1 (3), 1992, p. 281-304. [←](#)
7. Yannick Barthe, « Cause politique et "politique des causes". La mobilisation des vétérans des essais nucléaires français », *Politix*, 91 (3), 2010, p. 77-102. [←](#)
8. Nicolas Benvegna and Émilien Schultz, "« La sociologie des sciences a-t-elle une approche spécifique des controverses ?", paper presented at the Congress of the Association internationale des sociologues de langue française, Montreal, 2016. [←](#)
9. Francis Chateauraynaud, *Argumenter dans un champ de forces. Essai de balistique sociologique*, Paris, Éditions Pétra, 2011. [←](#)
10. Including the most critical ones, who invite us to be wary of the evidence linked to the claim of an interpretative neutrality, such as Dominique Pestre, « L'analyse de controverses dans l'étude des sciences depuis trente ans. Entre outil méthodologique, garantie de neutralité axiologique et politique », *Mil neuf cent. Revue d'histoire intellectuelle*, 25 (1), 2007, p. 29-43; Jérôme Lamy, « Controverses et STS : stop ou encore ? », *Zilsel*, 2 (2), 2017, p. 123-130. [←](#)
11. Nicolas Benvegna and Brice Laurent's definition was used in the context of innovative teaching designed within the FORCCAST program (<http://controverses.org>), I reproduce here a deployment of each of the terms of this definition written by Vincent Casanova. [←](#)



12. Bruno Latour, *Politiques de la nature. Comment faire entrer les sciences en démocratie*, Paris, La Découverte, 2004^{m3}[1st ed. 1999m3], pp. 149-178. [←](#)
13. Michel Callon, « L'innovation technologique et ses mythes », *Annales des Mines*, 34, 1994, p. 5-17. [←](#)
14. Thomas Tari is a sociologist at the medialab of Sciences Po and head of the Center for the Exploration of Controversies. This article was written on the basis of an introduction to the collective work *Controverses, mode d'emploi* (Clémence Seurat, Thomas Tari (eds). Paris: Presses de Sciences Po, 2021, 320 p., preface by Bruno Latour). [←](#)