The Democratization of Science*

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Abstract

The democratization of science entails the public having greater influence over science and that influence being shared more equally among members of the public. This chapter will present a thumbnail sketch of the arguments for the democratization of science based on the importance of collectively shaping science's impact on society, the instrumental benefits of public participation in science, and the need to ensure that the use of science in politics does not undermine collective self-government. It will then outline worries about citizen competence, the abuse of democratic ideals and the limits posed by the nation-state.

1 Introduction

The standard account of the relationship between science and democracy that was dominant in liberal democracies in the postwar period can be summarized, with some idealization, as follows. Science is a public good that provides various benefits to society. It improves the public's health, increases economic productivity, and contributes to national defense. It helps to produce effective policies. For these reasons, science should be financially supported by the public. But it should be self-governing. Outsiders cannot predict which research will promote the growth of science or produce social benefits. Their interventions will inevitably distort science (Bush, 1945; Merton, 1938; Polanyi, 1962).

The standard account insists on a strict division of labor between the public and scientists. The public, through the democratic process, sets social ends. Scientists then, inform the public about how to pursue those ends and the outcomes of different courses of action. Questions of ends and values belong to the public; questions of means and facts belong to the scientists (Weber, 1949).

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This neat division of labor envisaged by the standard account relies on two assumptions. First, science is a value-free enterprise. While cognitive values do play a role in science and ethical values impose certain limits, the context of justification is free of ethical and social values. Second, the public can reason about the ends it wishes to pursue independently of knowledge provided by science. According to the standard account, the choices that scientists have the authority to make do not influence the setting of public ends. They play a role only in the process of deciding how to pursue them. Both of these assumptions have been challenged by theory and experience. As a result, "an autonomous *and* authoritative science" has come to appear "intolerable" (Douglas, 2009, p. 7, emphasis in original). One response to this state of affairs has been a call for the democratization of science.

2 What is Democratization of Science?

The democratization of science sometimes refers to the redistribution of epistemic authority between scientists and laypeople to make it more equal. In this sense, it encompasses efforts to "democratize expertise" that erode the boundaries between scientists and laypeople by recognizing various forms of "lay expertise" (Collins and Evans, 2002; Solomon, 2009). While political and epistemic considerations cannot be fully separated, there is also a political sense of democratization. In the latter sense, the democratization of science is the widening of the scope of democratic control to include various decisions about science. This chapter is about this second sense of democratization.

A domain of social life is democratically governed when all relevant parties enjoy equal opportunity to influence it in light of an accurate conception of their preferences, interests, and values (Kolodny, 2014, p. 289; Pettit, 2012, pp. 21–22). Accordingly, democratization of science refers to (a) the increase of the public's influence over various aspects of science; and (b) the equalization of the opportunity for influence among members of the public; coupled with (c) the realization of the conditions that enable of members of the public to form an accurate conception of their interests and values, and gain knowledge of what will promote them.

Since its different dimensions come in degrees, the democratization of science is not an all or nothing matter. This has two implications worth noting. First, when pursuing the democratization of science, we need to pay attention to the trade-offs and interactions between its different dimensions. Second, calls for democratization of science can demand not full but partial democratization, and do so on principled grounds.

This definition does not identify democracy with a specific decision procedure or an institution. Rather, it identifies a set conditions that may be realized by different institutional arrangements and practices, which are to be evaluated in terms of how well they realize democratic rule (Pettit, 2012, p. 180; see also Dewey, 2012, pp. 120–1). In contemporary societies, the democratization of science will make use of both mechanisms of direct participation, such as citizen juries, consensus

conferences and deliberative polls, and representative institutions.[1] Given that the public has limited resources, it can increase its influence over outcomes by delegating some decisions to other agents (Plotke, 1997). Provided the public gets to decide which decisions fall into which category, who it delegates decisions to, and retains control over its agents, this does not diminish democracy since such measures increase its influence. Descriptive representation can also supplement traditional forms of publicly authorized and accountable representation. As the community of scientists begin to include members of excluded groups and come to resemble the society at large, this will also contribute to the democratization of science, because their choices will, to some extent, reflect the perspectives of social groups they come from.

In addition to combining direct and representative forms of decision-making, the public deliberation and influence required by the democratization of science will take place in many different sites (Habermas, 1996, pp. 187–280; Mansbridge et al., 2012; Pettit, 2012, pp. 187–280). The crucial insight of the proponents of the systemic approach to deliberative democracy applies to the democratization of science as well: it is the joint operation of various associations and institutions–"including informal networks, the media, organized advocacy groups, schools, foundations, private and non-profit institutions, legislatures, executive agencies, and the courts"–as a whole that will realize the democratization of science (Mansbridge et al., 2012, p. 2; see also Moore, 2017).

Calls for the democratization of science are sometimes ridiculed for demanding absurdities such as voting on the truth or falsity of scientific hypotheses. But, as we've seen, democracy is not just counting heads. And, it is not the acceptance or rejection of hypotheses that the proponents of the democratization of science want to address. It is, rather, decisions about the production, dissemination and application of science (Kitcher, 2001, 2011).

In the production of scientific knowledge, there are decisions regarding the setting of research priorities and the allocation of resources; decisions about the epistemic and practical goals that shape the design of experiments or studies, the operationalization of variables and the setting of evidentiary standards; more broadly, there is the question of how much critical scrutiny and evidence is necessary before a scientific finding becomes the basis of public action. There are also decisions regarding the dissemination of research. Should there be journals devoted to publishing negative results? Should the gender analysis of data be mandatory in medical journals? Should scientific publishing be open access? Finally, there are decisions in the application of scientific research in a specific context. Of the many candidate policies or technologies to achieve a given end, which one should be employed? Which local conditions should be paid particular attention to?

[1] For a survey of direct public participation in science see (Bucchi and Neresini, 2008). For a study of the role of representation in the democratization of science, see (Brown, 2009).

3 Why Democratize Science?

3.1 The argument from impact and instrumental benefits

The principle that all affected by a decision should have a say in it, provides one reason for democratizing science. Science and the technologies based on it can cause immense benefits and harms. They have a deep and often unavoidable impact on the lives not just of scientists but of everyone. Scientists, by themselves, cannot take into account all these interests that their activities will affect. It is only if people can influence science that they can protect and promote their interests. Thus, everyone who is affected by science should have a say in its governance—especially when it is publicly funded or when it can harm people's weighty interests (Kitcher, 2001, 2011).

The democratization of science also improves the application of scientific research by making better use of knowledge dispersed across society. It does this, first, by facilitating discussions that help identify and articulate public needs. Second, it takes better advantage of the epistemic diversity in the people and their local knowledge compared to top-down approaches (Anderson, 2006; Callon et al., 2009, pp. 89–94; Funtowicz and Ravetz, 1993; Wynne, 1992). Evidence for the effectiveness of a policy or technology will come from a specific context: its efficacy elsewhere is an open question that hinges on local conditions (Cartwright and Hardie, 2012). The people who will use a technology or scientific finding will have this knowledge. It will be farm workers who will use a pesticide every day, for instance, who know if the precautions sufficient for its safe use in lab conditions can be reproduced in the field (Irwin, 1995, pp. 17–21). Public participation in research, in particular the participation of marginalized groups, can also provide "transformative criticism" of epistemic goals and practices. It can encourage scientists to consider alternative research paradigms and shape research in ways that will better serve the public (Longino, 2004, pp. 134–5; Wylie, 2015; Brown et al., 2006).

The public can fully benefit from science and follow science-based policies only if it trusts scientists. Democratization can help build well-placed trust. Mini-publics enable a small number of citizens, who are demographically representative of the larger population, to interact with scientists and deliberate about technically complex issues. These mini-publics can act as "trusted information proxies" and offer members of the public scientific information they can trust (MacKenzie and Warren, 2012). In controversial cases, they can help the public find out whether the disagreement between them and scientists is due to conflicting interests or different levels of knowledge (Keren, 2015, p. 1293).

Democratic influence over scientific decisions can also make science more trustworthy for the public. When the public and scientists disagree about the badness of the consequences of different kinds of error in research, they cannot fully trust scientists (Irzik and Kurtulmus, 2019). Democratic deliberation can lead to revisions and alignments in these value judgments. It can thereby provide the basis for

enhanced forms of trust. Many sciences have been complicit in the domination of certain social groups and have neglected their interests–as has been the case, for instance, with medical science and African Americans, women, and LGBTI individuals. Ensuring that these groups have a voice in the governance of science can help build trust between them and scientists (Scheman, 2001; Grasswick, 2010; Koskinen and Rolin, 2019).

3.2 The argument from collective self-government

As previously noted, the standard account assumes that science can and ought to be free of social and ethical value judgements. This vision has been criticized by philosophy of science, putting pressure on the vision of autonomous science in the standard account by suggesting that an autonomous science can become an unaccountable source of power that undermines collective self-government. The well-established observation that no amount of evidence, by itself, entails a hypothesis, prompts two influential critiques of the value-free ideal of science: Longino's argument from underdetermination and Douglas's argument from inductive risk.

Longino has argued that some fact is evidence for a hypothesis only in virtue of background beliefs which are essential for evidential reasoning (Longino, 1990, pp. 40–55). These beliefs embody ideologies and social values: thus, values cannot be excluded from scientific inquiry (Longino, 1990, p. 216). Douglas's critique is based on the existence of inductive risk (2009; see also Lacey chapter 13). Since no evidence entails a hypothesis, there is always the risk of error in its acceptance or rejection: one can mistakenly accept a false hypothesis or reject one that is true. Usually, these risks cannot be minimized simultaneously. Thus, when setting standards for accepting or rejecting a hypothesis, value judgments regarding the badness of these two kinds of errors come into the picture. Douglas restricts her argument to "the choice of methods" and "the characterization and interpretation of data" (2009, p. 112). Biddle and Kukla (2017), however, point out that all stages of inquiry, not just the inference from evidence to hypothesis, are riddled with risks of error and value-laden choices. The operationalization of concepts, the inclusion or exclusion of borderline data points, and the choice of models involve risks of error and invite value judgements too.

If science provides crucial input for policy and if values play an ineliminable role in scientific inquiry, then scientists, whose work is not informed by the values of the public, can encroach the public's powers. Suppose, for instance, that the public intends to shut down a factory if the chemicals it releases into the air harm public health. They consult scientists to determine whether this is the case. Now, suppose that these scientists use a very high evidentiary standard for accepting and asserting that the chemicals are harmful. This would make it unlikely that the factory would be shut down. The scientists who adopt this evidentiary standard, or other actors who can influence their decisions, would be exercising political power that is not rightfully theirs. They would, thereby, be undermining the public's right to collective self-government. Such encroachments can be avoided by democratiz-

ing science and ensuring that the public's values figure in these decisions (Douglas, 2005; Elliott, 2011; Pamuk, n.d.).

The argument from collective self-government does not stand or fall with the critique of the value-free ideal. The proponents of the value-free ideal concede that values play a role when choosing research topics (Weber, 1949, pp. 21–2, 72–3). Those choices can also shape political decisions, because political decisions are sensitive to the existing policy options and what is known about them. If scientists develop certain policy options and neglect others or study the costs of some policies while ignoring the costs of others, their research can shape political decisions (Lacey, 1999; Sarewitz, 2010). For instance, scientists may concentrate their research efforts on preventing cancer or treating it. When studying its causes, they may focus on individual behavioral or environmental and social factors. The choices they make at each step can shape the health policies a society will adopt.

What the public knows, thanks to science, also shapes the ends it seeks to pursue. The public can seek to avoid risks only if it knows of their existence. It can only pursue goals that it thinks are possible. If existing research or the research that reaches the public suggests that there is uncertainty about the existence of a problem or the possibility of solving it, then this can effectively preserve the status quo. Very often, a social problem becomes a public concern only when scientists validate it (Weingart, 1999, p. 155). In all of these cases, scientists or powerful actors who can influence their research will enjoy substantial agenda-setting power: they will be determining what becomes an issue to be addressed politically and which options the public can choose from (Pamuk, 2019, pp. 11–2).

The choices that shape scientific research may be unintentional. They may be due to disciplinary biases or the demographic makeup of researchers. They may also be the intentional outcome of the interests of scientists or those who fund them (Fernández Pinto chapter 14). The tobacco industry, for instance, has selectively produced and shared research in order to create uncertainty about the harms of tobacco (Oreskes and Conway, 2011). This has helped them forestall public policy harmful to their interests. Recent studies of how this strategy works suggest that the problem is not necessarily biased research (Holman and Bruner, 2017; Weatherall et al., n.d.). Individual researchers may be impeccable, but the overall body of research that is produced and is filtered to the public and policy makers can create bias. If it is the total body of research that shapes political decisions, then democratic control of only the use of scientific research as an input to policy making is not enough: control should come at earlier stages—for instance, in the setting of research agendas. Both science for policy and policy for science should be subject to democratic control.[2]

4 Worries and Challenges

The major worry about the democratization of science concerns citizens' competence. If citizens' uninformed views shape science, then "projects with epistemic

[2]I am grateful to Zeynep Pamuk for suggesting this formulation.

significance would often be dismissed, perceptions of short-term benefits would dominate, and resources would be likely to be channeled toward a few 'hot topics'" (Kitcher, 2001, p. 117). In the application of science, it would be the arguments of demagogues rather than the best science that shapes decisions.

Worries about public competence should figure in all efforts to democratize science. But they do not justify outright rejection: case studies have documented how members of the public can achieve competence in scientific understanding. AIDS patients and activists have influenced AIDS research for the better (Epstein, 1996); the residents of Woburn, Massachusetts have discovered a leukemia cluster in their area and traced it to its cause (Brown and Mikkelsen, 1990); parents of children with spinal muscular atrophy have collected clinical data on the disease and set up a research institute (Callon et al., 2009); and many social movements have reshaped scientific research agenda by drawing attention to "undone science" (Frickel et al., 2010). Although exceptional cases of stakeholders influencing research, they demonstrate that ordinary citizens can acquire the relevant knowledge and skills–and also utilize their personal and local knowledge–to improve scientific research and practice, when engaged. They remind us that competence is not a given, but can change. Thus, efforts to democratize science should be coupled with efforts to increase citizen competence. Kitcher's proposal for deliberative polls, where scientists tutor a representative sample of citizens and citizens deliberate about the governance and application of science is one institutional innovation that can serve this goal (Kitcher, 2011).

The account of democratization offered in this chapter incorporates representative mechanisms. In some instances, the competence required of citizens will only be the ability to identify those who will successfully act on their behalf. Finally, since values play a crucial role in science, scientific competence is not the only competence that matters. The ability to articulate and to take into account different social interests and to deliberate about the common good also matters. Decision-making bodies that include citizens are likely to do better in this dimension than those that exclude them.

A second worry is that efforts to democratize science are open to abuse. In a democratic society, having citizens support your favored policy matters. As many corporations have realized, having citizens who appear to support your policy is a second-best. Thus, the hijacking of public participation in science by other actors is a persistent danger (Wilholt, 2014, p. 171). For instance, many patient advocacy groups receive industry funding that they don't disclose (Fabbri et al., 2020). Pharmaceutical companies use efforts to take into account the diverse medical needs of different social groups to extend patents (Fernández Pinto, 2018). Corporations set up astroturf groups that pretend to be grassroots organizations. These organizations create the appearance of public support for positions friendly to corporations and misinform the public (Otto, 2016, pp. 292–3). The danger of abuse, however, exists for *any* public ideal since rogue actors will have an incentive to hide their actions behind them. It is not a reason for rejecting the ideal, but a reminder that when designing mechanisms for public participation in science we should address

this risk.

Finally, despite all the changes brought on by decades of globalization, contemporary democracy operates at the level of the nation-state. Science, however, is a global enterprise. Even though much of it is done in affluent parts of the world, it affects the entire world population. Therefore, the argument from impact suggests a global extension of the democratization of science (Kitcher, 2011, pp. 117–8). Science produced in the affluent parts of the world also figures in policy making in the rest of the world through the transfer of research among scientists and through international organizations like the World Bank, the IMF, and the WHO. Thus, the argument from collective self-government also reaches beyond the nation-state. How to carry out such an extension in practice remains a challenge for the democratization of science.

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