

Michel Callon, Pierre Lascoumes, and Yannick Barthe (translated by Graham Burchell): *Acting in An Uncertain World: An Essay on Technical Democracy*. MIT Press: Cambridge, MA, USA, and London, UK, 2009. 283 pages.

Written to address the question of how science and technology might *democratize democracy*, Callon, Lascoumes and Barthe (2009, first published in French in 2001) write an elegant, sophisticated essay on science progress. A slogan such as *democratizing democracy* as an innovative human and desirable technological (sociological) tool for decision-making is a large task for philosophers and sociologists to tackle. But this is the core ideology wrestled within *Uncertain World*. Especially from the point of view of science education, the book answers interesting questions, such as why we do not focus more intently on pluralism in science education and why we are so content with a few generally accepted scientific understandings in light of culturally diverse epistemologies. The authors provide an acutely humble description of how laypersons have always been involved in progressing science and/or technical democracy in a way which challenges the *status quo*. The significant point of this book is that science is always mediated, and when democratized, others may become gainfully and authentically involved.

Early in the book, there is a considerable discussion of laboratory research and “research in the wild”, that is, research in which laypersons work with scientists to produce and disseminate knowledge. While it appears that the authors set up a dualism between laboratory research and research in the wild, they should not be misunderstood

as dichotomizing these different intellectual or data collection sites. For the authors, dissolving dualisms between culture and nature serve to emphasize democracy. They also illuminate the ways in which the non-human entities (instruments and so forth) play a role in our knowledge. At one point, they argue for a taboo science education by suggesting that research in the wild is mediated by considering, say, spirituality, witchcraft and weather folklore. Consequently, today’s science educators might consider “sorcery is a sophisticated theoretical construction engendered by exacerbated causal thinking” (p. 77).

This idea contrasts significantly to the way which science has been popularly portrayed by Edward O. Wilson and Richard Dawkins—who act as spokesmen for science—and say that all things will be eventually proved in the name of science. Callon et al. confidently write that, “when the expert abandons the investigation, powerless, the layperson bravely continues with it” (p. 78). This claim is well supported throughout the book, as they address how laypersons cannot be separated from what we call scientific enterprises, e.g., in case of nuclear waste.

Withstanding the history and philosophy of science, science is never separate from values and the authors make this point clear by elaborating how science is brought into being and how—when it tries to become seclude—it doesn’t take long before laypersons become more fully involved.

In contrast to thinking that democracy can function only if the people are kept at arm's length, the authors state:

Every fault deserves a punishment proportionate to its gravity. Who has sinned against democracy may pay with an increase in democracy. The eleventh commandment: anyone who silences those who should speak is condemned to organize ways for them to express their views! (p. 109).

From the point of view of the US science education, the thesis of the book provides fuel for organizing and being heard, for democratizing those who otherwise presume to serve as representatives for those who were never consulted in the choices, e.g., youth and teachers. Leave it to those who want to pry open the doors of democracy—a dialogical bible has emerged. Callon et al. speak of a science-in-the-making—in contrast to made science where research is completed—to elaborate on this point:

...one is in the world of research, of science in the making, and not of made science. What does change, however, is the scope of the research activity and its capacity to cope with emergent uncertainties. Delegative democracy gets rid of uncertainties related to research by confining it to secluded laboratories, but in so doing it deprives itself of a powerful tool for investigation: collaborative research, the only one that can fully explore these multidimensional uncertainties (p. 126).

The goal is to shift towards a search for commonality and desired worlds, in other words, while keeping in mind that a *hybrid forum*, that is, a public space where heterogeneous groups and spokespersons

discuss, likely brings about dialogical democratic common grounds. The authors provide at length responses to possible scrutiny to what they are theorizing. The book handles a controversial idea with delicate hands—the authors tread lightly on democratizing democracy, where one infers that the status quo of science, technology and politics must always be mediated.

In the final portion of the book, the authors present ideas about hybrid forums for policymaking—they discuss focus groups, public inquiry, consensus conferences, and citizen panels and juries. Most importantly, they discuss the significance of democratizing procedures for involving—rather than simply allowing—others to participate more fully in *measured action*. Measured action here refers to acting in situations of great uncertainty in accordance with the well-known precautionary principle (p. 191). They advocate for participatory democracy or a responsibility that emerges from group dialogue. They provide an excellent discussion of how the precautionary principle informs our work, and theorize why politicians and scientists might collaborate to mediate possible and desired worlds. The impact of this book will be the extent to which measured actions are accepted within policy.

As a researcher in science education, I seek to find answers for how we should live in relation with other people, nonhuman species, and the ecological world through school sciences. As a parent and someone who is very concerned about the ways in which schools are measured, I seek answers for guiding conversations around legislation and school policy. Correspondingly, as a teacher of beginning science teachers, I seek answers for why methods of science teaching courses are approached as if they are a set of strategies that have been carved out of stone, why animals are dissected when we have emergent technologies that

students are more attracted to, and why the ways in which students are being tested have little to do with their neighborhoods. *Acting in an Uncertain World* was of use for me when I needed a book that addresses how individuals come together to negotiate their measured action, choices and personal advocacy, in a way which the authors refer to as democratizing democracy concomitant technical democracy.

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