

The evolution towards diversity and inclusiveness  
in the social construction of STS.

Introduction:

The introductory seminar to STS focused on the question “What is STS?” At that time, I would not have had an answer. But as the semester progressed, I realized that science and technology are a compilation of many things that permeate our daily lives, with social constructions that are constantly changing. Some of these changes occurred because anthropology, economics, history, literature and sociology became more interconnected and inclusive of minorities and women. This inclusiveness is far from complete, but the momentum for changes in the social construction of science and technology has been evolving exponentially since the mid-twentieth century because minorities and women have entered these two fields and brought with them a collective consciousness of inclusiveness and diversity.

The purpose of this paper is to provide supporting evidence of the changes in the social construction of science and technology from a male-dominated exclusive community, to a gendered diverse community that includes minorities and women. To provide evidence for that premise, I have chosen three papers Professor Pollock introduced the second week of class by Donna Haraway, Bruno Latour, and Steven Shapin and Simon Schaffer, to show the beginning of this process; Professor Schatzberg’s assigned reading of Martina Heßler’s book Chapter on the *Frankfurt Kitchen*, and a study by Professor Mary Frank Fox on *Programs for Undergraduate Women in Science and Engineering*, and finally, Professor Pearson’s assigned article on Robert K. Merton’s *The Normative Structure of Science*.

## DISCUSSION

In *Leviathan and the Air-pump*, Steven Shapin and Simon Schaffer focus on Boyle's experiment on the air-pump, the creation of the *modest witness* and his role in determining *matters of fact*.

*Human agents make theories and interpretations, and human agents therefore may unmake them. But matters of fact are regarded as the very "mirror of nature" (23).*

The authors emphasize the importance of Boyle's research because it resulted in a paradigm shift of scientific methods into modernity. *Matters of fact*, underscored notions that *right rules of discourse* would create a moral community of experimentalists who would insure the sustainable transparency of experiments. Unfortunately, Boyle did not strictly follow those *right rules of discourse* to the letter because of political and social conditions that challenged his research. The atmosphere of secrecy surrounding the air-pump experiment gave dissenters cause to challenge the air-pump's *matters of fact*.

Another factor that caused problems for Boyle's air-pump experiment was his selective choices of people who could *witness* the experiments. His *modest witness* was carefully chosen and looked to Boyle for instructions on how to answer questions about the air-pump experiments. Boyle may have also manipulated some of the data to hide problems with construction and implementation of the technology (69-79). Although the air-pump had dissenters who caused problems for Boyle, it was still a powerful artifact that thrust science and technology into modernity. Fields, that continued to be male dominated for hundreds of years.

Bruno Latour's *Science in Action. How to Follow Scientists and Engineers Through Society*, also focuses on the importance of establishing *matters of fact* for scientific research and uses the two faces of Janus to show that there are different ways to interpret scientific facts. Latour stresses the importance of *observing science in action* (21), and points out that *matters of fact* will always be challenged (59), but *facts are facts* and speak for themselves (99).

Donna Haraway provides an intriguing feminist perspective on Boyle's *modest witness* and the transparency of Boyle's experiment. I see Donna Haraway on one side of the Janus face representing a feminist gender perspective, and Bruno Latour, Steven Shapin and Simon Schaffer in the other Janus face representing a male dominated scientific society.

Haraway first presents Shapin and Schaffer's three constitutive technologies for experiments they outline in the book (25),

*"1) a material technology embedded in the construction and operation of the air-pump; 2) a literary technology by means of which the phenomenon produced by the air-pump were made known to those who were not direct witnesses; 3) and a social technology that incorporated the conventions experimental philosophers should use in dealing with each other and considering knowledge-claims"*

and then goes on to challenge the reader to consider *matters of fact*, like *situated knowledge*, from an alternative, gendered perspective. Haraway opens a *Pandora's black box* (to coin Latour), when she states that *transparency* is a *peculiar modesty* (26). It is apparent that Boyle's experiment was not completely transparent, but it is still being touted as causing a revolutionary paradigm shift of science to modernity. A modernity that supposedly has established *right rules of discourse*. Her challenge is not only about

the scientific methods Boyle used in his experiment to established matters of fact, but to the continued lack of transparency that a male dominated scientific and technological culture had carried to modernity.

Martina Heßler's book Chapter on the Weimar Republic, Federation of Housewives, and architects Ernst May and Margarete "Grete" Schütte-Lihotzky's decision to exclude German working-class women from contributing to the design of the *Frankfort Kitchen* provides an insightful example of women who used their gendered agency and power, to shape the outcome of a technological experiment.

German industrialists and architects envisioned the *Frankfurt Kitchen* as an avenue to bring working-class German women into modernity. What the coalition did not consider was the social construction of the family—a social construction that centered around the kitchen. Heßler's book Chapter brought forward a powerful example of how German working-class women challenged the hubris of a male-dominated scientific and technological community, and won. These women were early feminist who demonstrated by their actions an example of how the social construction of science and technology had been forced to change.

*Programs for Undergraduate Women in Science and Engineering* is a study Professor Fox, et. Al. published in 2011, that focused on the *disparities in the number of undergraduate majors and degrees awarded to women compared to men* (590). I chose this article because Professor Fox underscored the importance of women entering these two fields because they have a great deal of power in deciding policy changes for society.

The study reveals both positive and negative outcomes for undergraduate women's successful completion of these programs. On the one hand, programs for undergraduate women located, disproportionately, in research institutions are lower for women than men (604), but on the other hand, programs that have adequate funding, and are more structured, have a greater focus on providing supportive environments for women. The study also underscores the importance of the classroom climate and diversity of faculty, and that female students thrive better in academic environments that are inclusive, and provide social constructions that gives them more opportunities to engage in activities related to their chosen fields (607).

I have chosen to conclude this paper with Professor Pearson's assigned reading, *The Normative Structure of Science* by Robert K. Merton because it brings the evolutionary process of science and technology full circle. Merton wrote this article in 1942 during a time when the social construction of science was going through dramatic changes. To adequately present the article would take several pages, so I will only cover salient points. Merton points out in the article that "*The ethos of science is that affectively toned complex of values and norms which is held to be binding on the man of science*" (269). These norms are legitimate terms of institutional values. He continues by stating that the institutional goal of science is the extension of certified knowledge—which is based on empirical evidence that is adequate and reliable. Merton believes that there are four sets of institutional imperatives that comprise the ethos of modern science.

They are: Universalism—the canon that truth-claims, whatever their source, are to be subjected to pre-established impersonal criteria. He goes on to underscore the importance of not excluding individuals from participating in science because of race,

nationality, religion, class, and personal qualities (and I would add gender).

Communism—*the nontechnical and extended sense of common ownership of goods*

(273). Merton believes in the importance of social collaboration and stresses the imperative that science should be in a public domain. Disinterestedness—focuses on the importance of scientists being transparent with their research methods. This ensures that scientific discoveries are not based on fraudulent practices (275-276). And finally, Organized Skepticism—this is based on scientists questioning *matters of fact*, if they appear “too good to be true” (277-278).

## CONCLUSION

Science and technology began with a male dominated coalition of individuals who purported to have *transparency* in scientific discoveries by providing *rules of discourse* that resulted in immutable *matters of fact*. Donna Haraway addressed these flaws, by focusing on the *modest witness*' lack of *transparency*. A lot has changed since Boyle's air-pump experiment. Although the biases against minorities and women participating in science and technology are still visible, I believe that the social construction of science and technology is on a trajectory that is evolving towards a collective consciousness that is inclusive of all segments of society.