The Social Role of Technoscientists

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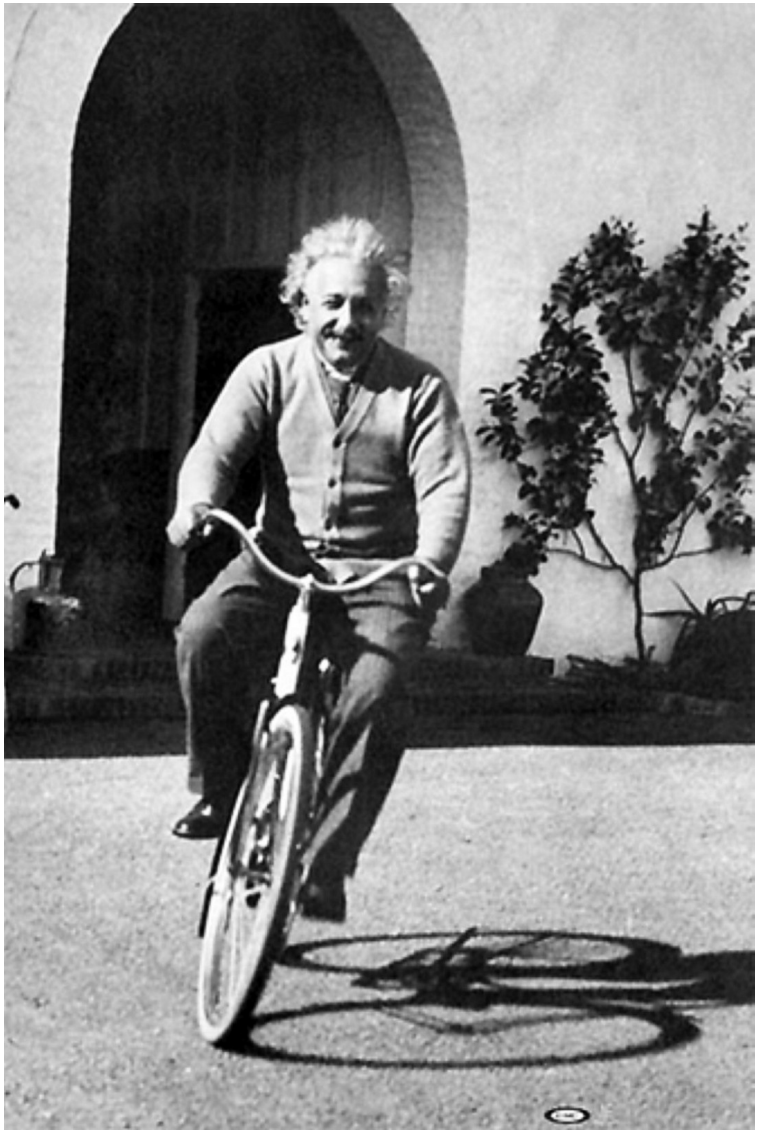
Science, Technology and Society (LE202)

Popular images: Truth to power

- We have the image of the aloof dreamer, with no interest in anything but the truth.
- The idealist who stands up for what she believes in no matter what the cost to her personal safety or financial security.
- The scholar who uses the ideals of scientific practice to criticize the social order and the powers that be.



Popular images: Knowledge is power

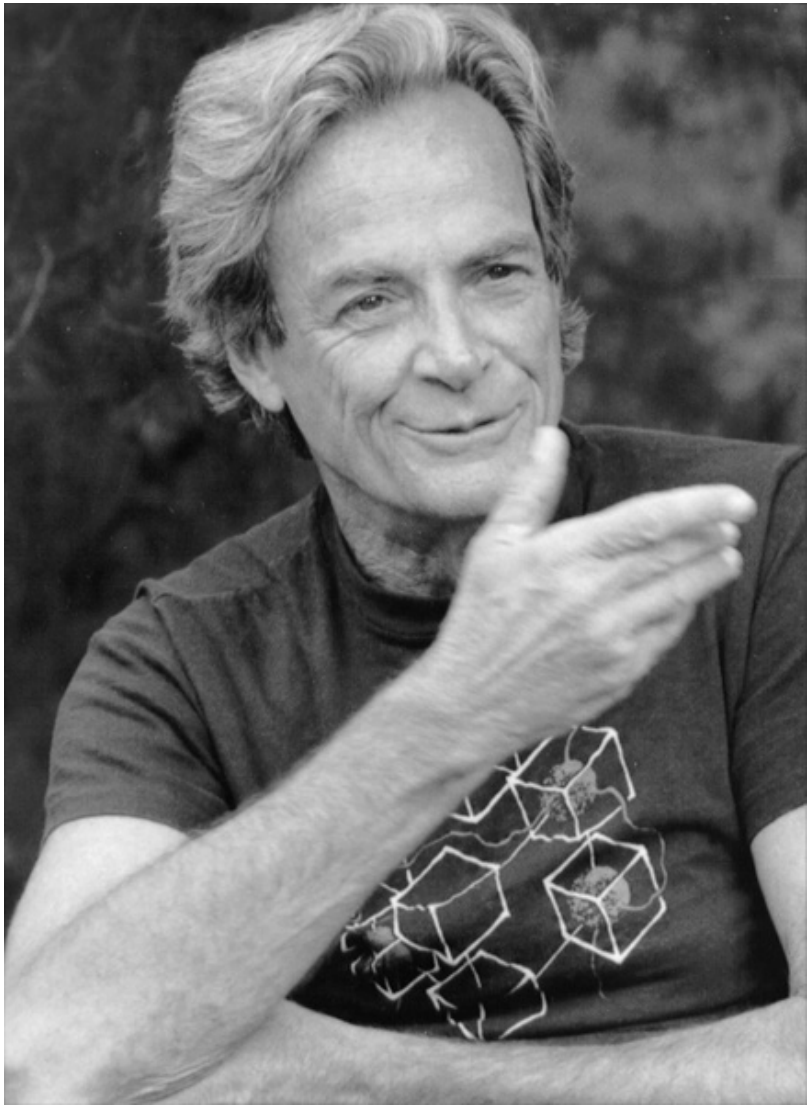
- We have the classic image of the mad scientist.
- The technocrat working with the government to control people, to make weapons, etc.
- The industrial technoscientist working with big business to make money at the expense of the best interests of their customers.
- The power-hungry engineer who uses his knowledge to strike a *Faustian bargain*.

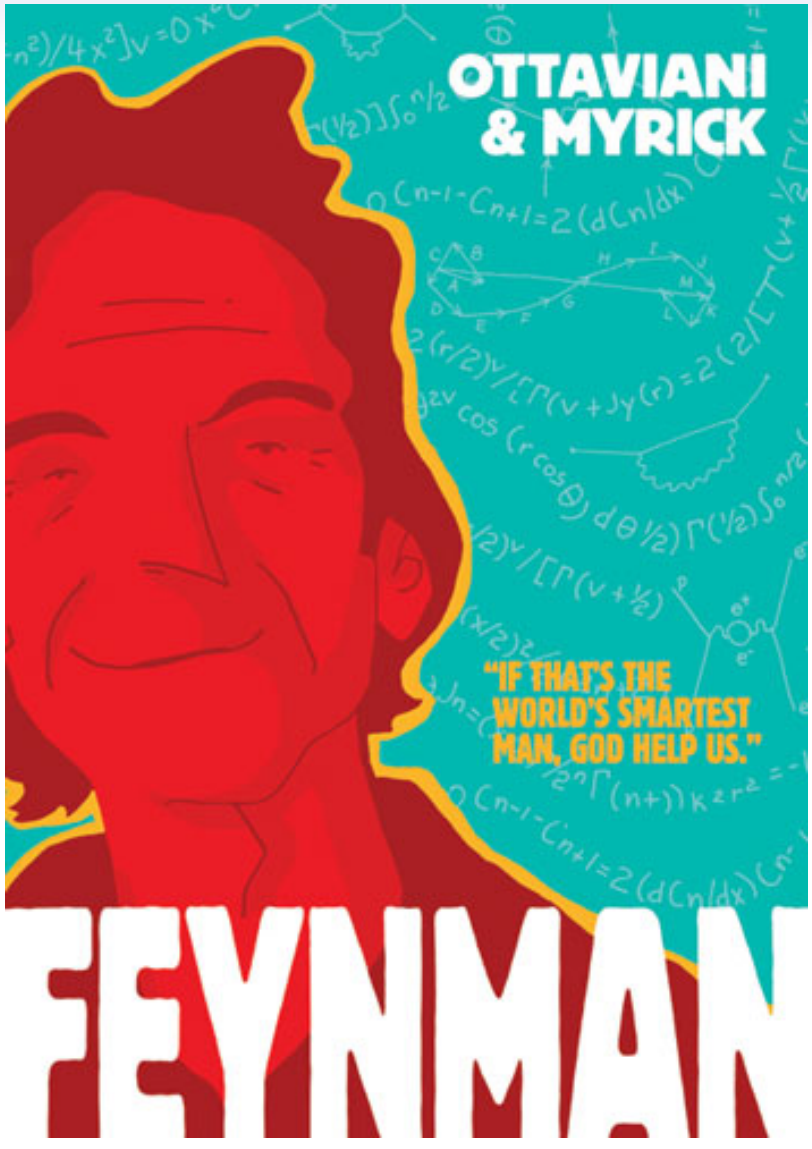
Popular images: The geek

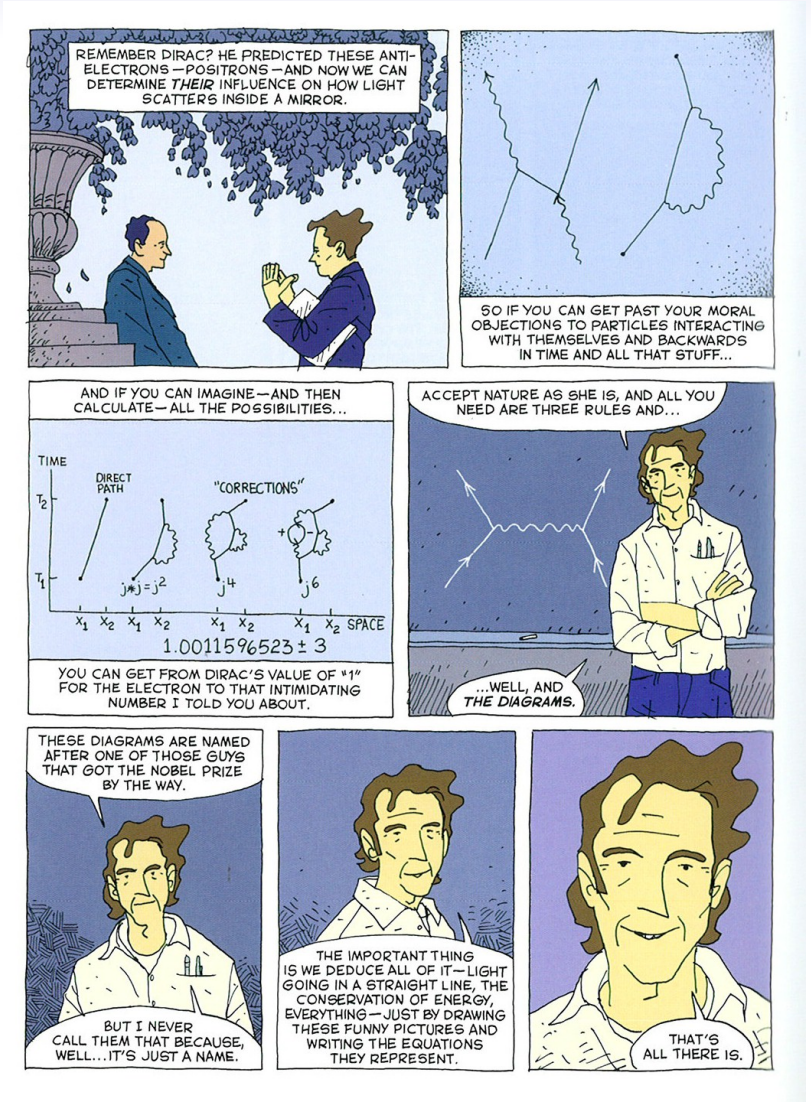
- The typical image from popular TV shows depicts the technoscientist as a socially awkward geek, who may be brilliant in one area but is generally clueless.
- We have the classic picture of a scientist in a white lab coat, with glasses and a pocket protector.
- This image is especially prevalent in fields like computer science and engineering, in which there are relatively few women.

Popular images: The renegade

- We have the image of the loner, who has no interest in the norms of regular society.
- Kary Mullis went surfing on the day he won the Nobel Prize for Chemistry (1993). Richard Feynman used to often talk about how he worked out some equations, or corrected some exams, at a local strip club.
- Scientists, who have the freedom to wear whatever they want often make disparaging remarks about "suits."





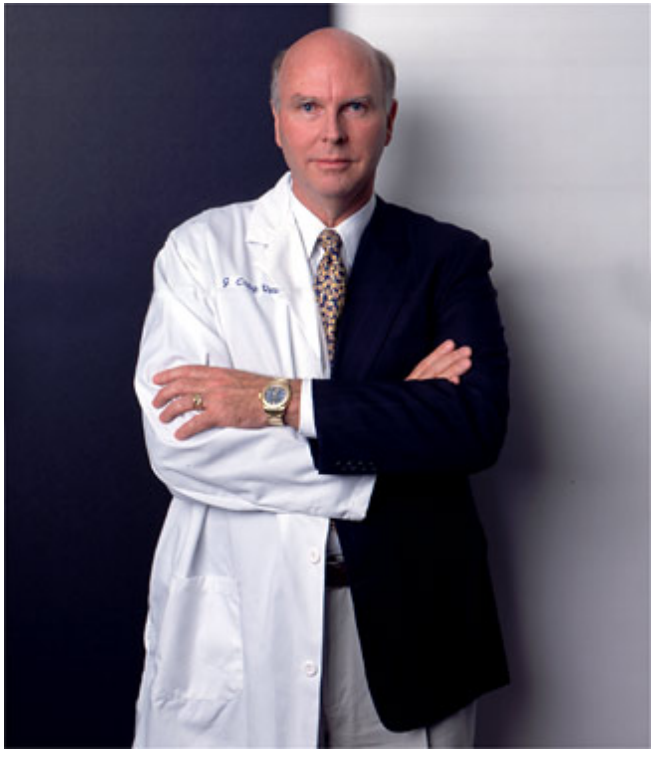


A comic about Richard Feynman, 2011

Richard Feynman's Van

Popular images: The entrepreneur

- We have the classic image of the brilliant young entrepreneur who is too busy starting his own company to finish school: Steve Jobs, Bill Gates, Mark Zuckerberg.
- Craig Venter started a private company to work on the Human Genome Project and to create "synthetic life."
- Now there are whole industries based on funding brilliant young technoscientists to start their own firms.



The place of technoscientists in modern society

- Technoscience is at the very center of our modern societies: government, military, health and education systems, economy.
- Technoscientists are in a position to define what the world is like. Indeed, to a large degree they shape the modern world.
- A large number of people are paid to deploy their technical skills and modern states pay a lot to train these people.
- Technoscience is regarded as an engine of economic growth.
- Technoscience is closely integrated with power.
  - Government agencies that regulate industry are often staffed by the same experts that work in the industry they regulate.
- Technoscientists are engaged in a range of activities from producing knowledge, to producing money and power.

Sociologists study scientists

- Starting in the 1970s, sociologists began to study scientists and produced two new fields: (1) Sociology of science and (2) Sociology of scientific knowledge.
- Sociology of science aims to study the *social aspects of scientific practice*, but *not* to deal with scientific knowledge itself. In this sense, it preserved the idea that scientific knowledge is privileged, in a black box.
- Today we will look at Robert Merton's claim that scientific practice is governed by a *special* set of norms as described in his *Sociology of Science* (1973).

Definition (Norms)

Norms are *informal rules of behavior* that work through rewards and sanctions from the social group to the individual.

Universalism

- The criteria used to evaluate a claim must not depend upon the identity of the person making the claim.
- Merton (1973): "Race, nationality, religion, class, and personal qualities are irrelevant."
- This norm supposedly comes from the *impersonality* of scientific laws.
- Examples: The peer review system is anonymous, and conducted by one's peers. *Ad hominem*[1] arguments should not be given any credit, etc.

[1] Directed at the individual, as opposed to at ideas, words, content, etc.

Communalism

- Scientific knowledge, the central product of scientific activity, should be the common property of the human race.
- Discoverers can claim recognition, but they cannot control how the knowledge they produce is used or disseminated.
- Example: Scientific knowledge can be published, but it should not be patented and restricted for personal or private use.
- The communalistic aspect of scientific work serves the community of scientists because it allows them all access to much more knowledge than they could individually produce.
- This reflects the fact that science is a *social activity*, since scientific achievements are *always collective achievements*.

Disinterestedness

- This is supposedly a form of *integrity*.
- Scientists should be emotionally disengaged from their actions and from their judgments.
- Scientists should report their results fully, no matter what theory the results appear to support.
- Examples: Scientists sometimes publish refutations of their own ideas or claims, scientists are sometimes willing to change their views in light of contradictory evidence.
- Disinterestedness should rule out fraud, fabrication of data, suppression of data, etc.

Organized skepticism

- The tendency of the scientific community to disbelieve new ideas until they have been well established.
- New claims *should* be greeted with an array of public challenges.
  - For example, at conferences scientists often fiercely challenge each other's ideas.
  - This is often especially true amongst friends or people working in the same group.
- Any one who announces a new theory or experimental result must be prepared to withstand these challenges.
- Scientists often reserve judgment on new claims.
- The ultimate form of this skepticism is silence. Scientists simply ignore work that they regard as "not even wrong."[2]

[2] This phrase was coined by Wolfgang Pauli (1869–1955).

Scientific norms: The reality

- In fact, however, scientific norms are not fixed. They change from time to time and place to place.
- Moreover, some of Merton's norms are *professed* in many areas of society and may not be statistically higher in the sciences – this would have to be studied empirically.
- When we study the details of scientific activity, we can find many examples of people violating the norms. Indeed, engaging in the opposites: *secrecy*, *particularism*, *interestedness*, and *credulity*.
  - Labs keep their work secret, and their resources protected.
  - Scientists are often taken at their word, or discounted, because of their reputation, or their institution.
  - Without conviction "one wouldn't have the energy, the drive to press forward against extremely difficult odds." (Mitroff, 1974.)
  - Dogmatism allows people to build on each other's work without checking everything again.

Norms as resources for discourse

- Since norms are flexible, we should look not at how they *operate*, but at how they *are used or invoked*.
- Norms are used to create the image of the ideal scientist.
- Norms are used to diminish the importance of some arguments and increase the importance of others.
- Scientists use norms to explain and to criticize each other's actions.
    - In the debate between Heisenberg and Einstein, people claimed that Einstein was being "conservative" because he was older. This helped people understand how Einstein could be "wrong." Moreover, since he was not *disinterested*, his objections to quantum theory did not have to be taken seriously.
- In a time of paradigm shift, or changing worldview, one of the main tools for argumentation are social norms.

Boundary work

- When issues of epistemic authority arise, people attempt to draw boundaries around who has the authority to know.
  - Science is considered to be rational because of successful efforts to define it as *rational*.
  - Science is connected to nature because it has acquired the authority to determine what nature is – to speak for nature.
- When a scientist commits fraud, his colleagues draw boundaries around what he has done to isolate it from the rest of the field.(Schön, Hwang, Obokata, Gino, etc.)
- When a catastrophe reveals the miscalculations, or shortsightedness, of engineers, others in the field draw boundaries around it, to isolate it from similar projects.

Definition (Boundary work)

Boundary work is a concept with broad applicability. It is a *rhetorical technique* that mobilizes *norms* and other *resources* to expand, or delimit, the jurisdiction of various fields of knowledge.

The ideology of merit

- One of Merton's principle claims was that science is a true meritocracy.
- Of 55 US Nobel Prize winners in 1963, 34 of them worked with 46 previous winners. But, is this an *elite group* or a *prestige group*?
- Studies show that, of scientists with the *same record*, those who are hired at prestigious universities are much more likely to be successful (papers, grants, awards, etc.).
- How do we judge scientific productivity? Sociologists have used *citations* for this, but there are problems with this approach.
    - A 2006 study: "Persistent, smart, civil, creative, entrepreneurial, aggressive, tasteful, confident and adaptable."

Definition (Cumulative advantage)

"For whosoever hath, to him shall be given." In science, success breeds success.

Women in the sciences

- The images we saw of iconographic scientists were all men.
- In the US and Europe, over 50% of university graduates are women, but the numbers begin to decline as we look at graduate school, postdocs, faculty and gatekeeper positions. In Asian countries, the situation is more slanted towards men.
- Delamont (1989): Women have a more difficult time "getting in, staying in, and getting on."
  - Women have a harder time breaking into the social networks of graduate school.
  - Women have a harder time securing good positions.
  - Women's accomplishments are not recognized as readily. (In a study, for a woman to get the same "competence score" as a male colleague, she needed to have 3 more papers in top journals or 20 more in midrange journals.)
- Women suffer from cumulative disadvantage.
- Fewer women are interested in technoscientific careers.

Final remarks

- We have looked at popular images of technoscientists.
- We have explored the function of norms in technoscience and seen that it makes more sense to understand them as resources than as causes.
- We have looked at the notion of rhetorical resources.
- We have questioned the idea that technoscience is a pure meritocracy.
- This gives a broader picture of the sense in which technoscience is social and the role that it plays in our societies.