Introduction to Science and Technology Studies

Waseda University, SILS,
Science, Technology and Society (LE202)

The basic concepts

Let's take some very simplistic definitions of what we will be studying in this class.

Science: Investigations of the physical world, including us and the stuff we make

Technology: Making stuff, including stuff used by society, and in the production and dissemination of science

Society: The sum total of our interactions as humans, including the interactions that we engage in to figure things out and to make things

It should be clear that all of these are deeply interconnected. As this class proceeds, we will begin to develop a better picture of the fundamental nature of this interconnection.

The field of Science and Technology Studies

In this class we will explore the interaction of science, technology and society, especially in the recent past (20th & 21st centuries).

- Science and Technology Studies (STS) is a relatively recent discipline, originating in the 60s and 70s, following Kuhn's *The Structure of Scientific Revolutions* (1962). STS was the result of a "sociological turn" in science studies.

- STS makes the assumption that science and technology are essentially intertwined and that they are each *profoundly social* and *profoundly political*.

- We will spend some time trying to *define* science and technology in the next two weeks.

- Today, I will try to make the case that science and technology are both social and political.

Being critical

In this class, we will try to develop a critical stance towards science and technology. This does not mean that we are going to cast them in a negative light, or that we need to develop a dislike for them. Many of us, myself included, have a high regard for science and technology.

Definition (Critical Stance)

A *critical stance* is the *deliberate* creation of distance between us and the object we study.

In order to be critical we must step back and ask broad questions.

- Science claims to produce knowledge about the world. What is the nature of this knowledge? Is it absolutely certain? Are there other kinds of knowledge? And so on...

- Technology claims to improve our lives. Who is us? What does it mean to have a better life? What's to be gained and what's to be lost. And so on...

Internal and external perspectives

When we study science and technology we can take an internal or an external perspective.

- An internal perspective starts with the principles and assumptions that scientists and engineers themselves work with and then uses these to try to explain their activities.
    - The development of an internal perspective requires mastering the details of the science in question, takes years of hard work to acquire and involves nonverbal assumptions and practices picked up in this process.
    - We usually rely on experts for an internal perspective.

- An external perspective uses a different set of assumptions and attempts to analyze the context in which experts live and work, as well as what they say.
    - We may be interested in their behaviors, goals, rhetoric, etc.
    - We try to analyze the activities of technical experts, without any appeal to the special status of their expertise.

A "classical" view of science and technology

A typical, naive view of science might be as follows:

- Science is a formal activity that creates knowledge by direct interaction with nature.
- Science has some kind of *special method* that allows different scientists to produce the same kind of knowledge whatever their social and political context might be.
- Scientists perform the same experiments in the same way, and agree upon and reject the same hypotheses.
- Scientists come to consensus on the truths of the natural world.
- We have a sort of black box:

$$\text{Nature} \longrightarrow \boxed{\text{Science}} \longrightarrow \text{Truth}$$

The demise of the "classical" view

The classical view began to fall apart in the process of 20th century investigations of scientific activity.

- Philosophers were unable to formalize the "black box." There appears to be no single "scientific method."

- When historians began to explore past scientific activities more closely, they found there was no such thing as "pure science," removed from social and political interactions and assumptions.

- When sociologists began to open the black box of contemporary scientific activity, they found that the inside was thoroughly social and political.

Then, why do most people still hold the naive view?

"Scientism"

- Scientism goes back at least as far as the Scientific Revolution (c. 1550–1700) and originates in the claim that there is a sharp divide between "facts" and "values."
- According to this view, when we do science, we set aside values and study *only facts*.
- The authority of science rests on its claim to be "value free" and hence "objective."
- Scientism promotes the idea that all of society's problems can be solved by experts who are specially trained to unearth the *facts of the matter*.
- Scientism, and the scientistic movement, make the claim that science is for the benefit of all of humanity.

"Technological progressivism"

- Technological progressivism has its roots in the European Enlightenment (c. 1700–1800), when progress became a synonym for good and technology came to be seen as a fundamental tool in *progressive projects*.

$$\text{Good} = \text{Progress}$$
$$\text{Progress} = \text{Technology}$$

- Technological progressivism assumes that technological change is inherently good and sees it as self-propagating, moving by the internal constraints of technology itself.
    - For example, we view new technologies as progressive and older ones as old fashioned and use this as a *reason* for changing technologies.
    - We advocate the adoption of new technologies with little reflection on their social impact or the broader question of whether or not we want those impacts.

"Technoscience"

- In the classical view of the relationship between science and technology, science leads the way by creating knowledge from nature and technology follows by applying this knowledge to the creation of new things.

- In this class, we will investigate the complex interaction between science and technology and the social environments in which they are produced, and which they, in turn, produce.

- We can call the sum total of scientific and technological activities *technoscience*.

Definition (Technoscience)

Technoscience is the combined total of scientific and technological ideas and activities *in their social, political and economic realities*.

Modern society is *thoroughly* technoscientific

- Nobody has any doubt that modern society is technoscientific.

- Modern nation-states and the global economy, itself, could not function if they were not based on technoscience.
- Every aspect of our lives are permeated by the products of technoscience.
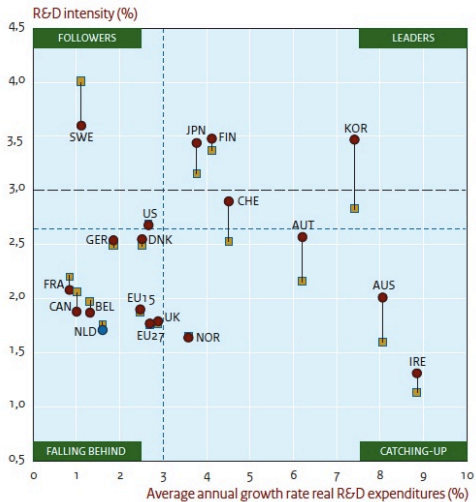- It is impossible to understand modern society, without studying the effects of technoscience.

Figure : R&D funding as a % of GDP plotted against technoscientists per million people

Figure : Government report on technoscience funding, Neitherlands (NLD), 2011

What makes something social?

- Society is the result of people, and institutions, interacting with one another. It is a sort of *epiphenomena* of these individuals.
- Society in turn shapes the people and institutions that form it.
  - Most people experience society *as though it were an external force* acting upon them.
- The "effects" of society operate through the vague mechanism of social norms. Norms "tell" us what we should and should not do, what we should and should not think. But they are not rational – or rather, their rationality is not universal.
- Norms produce the values that we use in interacting with others. They produce many of our core ideas – such as ideas of the place of *class*, the role *gender*, the meaning of *race*, the function of *justice*, the importance of *objectivity*, the criterion of *truth*, the significance of *evidence*, etc.

Technoscience is social

In the simplest sense, technoscience is the product of people, and people are social.

But it is possible to claim something *much stronger* than this:

- The social norms of technoscientists affects where they will look, what they will see and what they will say about it. (Their worldview.)
- Technocientists' norms are shaped by their discipline. (Basic scientific concepts mean different things in different fields.)
- Professional norms affect the value that technoscientists place on judgments.
- We find disagreement about what counts as science across time and from place to place.
- The development of technology is highly social, and depends on the manipulation of social norms.

What makes something political?

- Politics is about control. It is the result of the distribution and utilization of power in our societies.
- Political activity functions by employing various *structures*, *resources* and *discourses* in order to consolidate and wield power.
    - Political structures are formal and informal "rules of play." Formal rules are things like laws and procedures, informal rules are things like social norms.
    - There are many kinds of political resources: natural resources, money, military force, knowledge, access, charm, etc.
    - Politics uses discourses to control what is sayable and what is not, to control the way in which something is said and the framework of what is discussed. Dominant discourses lend a kind of cultural authority.

There is, obviously, no clear boundary between the social and the political.

Technoscience is political

- There are formal and informal rules that dictate who can make decisions about how to proceed with technoscientific work.
- Different political structures create different opportunities, at the national level, the level of institutions, and the level of individuals.
- Individual knowledge workers (technoscientists), various institutions, and different professional groups all use economic and cultural resources to advance their aims.
- Discourses can be developed by appeal to both social and scientific norms. These discourses can then be used as resources to advance technoscientific work.
    - This is often referred to as the production of social capital.

Final remarks

- We all know that our modern societies are technoscientific.
- I have argued that we should also consider the claim that technoscience is *profoundly* social and political.
- As this class progresses, we will see many examples of the complex interactions between science, technology and society.