

Resource Guide

Cultural Dimensions of Science: The Influence of Industry and Government on Research and Development



[1] Illustration by: Symphony Guiden (grade 7)

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The objective of this resource guide is to explore the cultural dimensions of science through the influences of Industry and Government on research and development (R&D) in Western society. By examining the influences of capitalism, private funding and administrative agendas on R&D one begins to understand how culture shapes science, while at the same time, science shapes culture.

How Does One Define Culture?

To begin this process, a general understanding of culture becomes important. From an anthropology tradition, culture can be defined as codes of conduct as seen in social life. From a sociology-of-knowledge tradition, culture is the symbolic products of a group [8]. In examining science as culture these two definitions become interwoven, as science is one of the conducts emerging from Western society and Western science and technology are symbolic products of their culture.

Who Benefits from Science in a Capitalist Society? A Simple Exercise

A simple exercise to begin to visualize the ways in which science and culture are entangled in a Western capitalist society is by analyzing the illustration [1] on the cover of this resource guide. A 7th grade girl submitted this picture as part of *Discover Magazine's* Cover Design Contest. In her contest statement she stated, "The time will come when you will have to pay a lot of money to go into space" (Simphony Guiden, 2008). Here one can see a young women's early understanding of the ways in which science and technology benefit those with power and resources. One can also see the cyclical relationship between science and those with access to resources and power. For if science and technology benefit the elite, then the elite will be more interested in science and technology. This leads to a series of questions concerning the "objective" nature of science, technology, research, development and knowledge. It also provides an excellent starting point for the material covered in this resource guide.

Capitalism and Modern Science and Technology

Many historians believe, modern science (and positivism) evolved out of the transition of societies from a Feudal system into a Capitalist system [3]. Whether modern science is a product of capitalism [3] or not [6], [12] is debatable, however, there is no denying that forces of production, social relations, science and technology all intersect, thereby making science and technology a social process [6]. Again we see another cycle where capitalism both shapes modern science and is shaped by science.

From a Marxist perspective, the capitalist/science structure becomes problematic as scientists become another form of "labor" and therefore are subjected to costs, control and supervision [3], [9]. Scientists begin to understand their knowledge in terms of "commodities" that can be bought and sold both by themselves and their employers [2]. Therefore, scientists find themselves influenced by both internal and external forces. Two of the external forces examined here are government and industry. These are two of the strongest social institutions in any capitalist culture.

Government and Its Power to Create Policy and Knowledge

Political administrations have the power to manipulate the processes through which scientific knowledge is released and applied in any society [2], [10]. Methods of manipulation include dismantling advisor committees, censorship, not seeking independent scientific advice and nominating individuals with clear administrative agendas to specific science related posts [10]. A capitalist culture is more likely to use these tactics to further capitalism, increase profit and further expand. Take the cases of the FDA's attempt to silence physicians who wanted to report the dangers associated with FDA approved drugs [10]. These cases demonstrate how the government employs tactics not only to avoid a negative reaction from members of society but also to protect profits.

Government administrations also have the power to determine how much funding will be directed to specific fields of R&D. For example, an administration can determine how much public spending will go toward defense and the development of new weapons systems and how much will be appropriated to ecological R&D. In the United States, financial support of defense and weapons technology has been justified as a necessity to insure stable peace [2]. Here one can observe another dimension within the web of science, technology, politics and power.

Governments often use the R&D as a tool in foreign policy. Technology has been used to create alliances and punish disruptive nations. This can be seen in information exchange, transnational institutes and embargos [2]. By examining science from a socio-political frame one can see it as a medium for understanding what cultures have similar agenda (alliances) and what cultures are at ideological odds [2].

Industry and Private Funding: The Case of Pharmaceuticals

Private corporations and industries are the top funders of research and development. Through private funding R&D becomes a business investment, driven by profit and expectations of future returns [3], [5], [9]. Some of the methods corporations and industries use to influence R&D include funding in-house research, funding research institutions, funding NGOs, public-private partnerships, placing company representatives on academic research councils, and pressuring scientists who obstruct commercial agenda [7].

One of the clearest examples of the influence of private corporations on science and technology can be seen in the R&D of pharmaceuticals. A study published in the *British Medical Journal* [4] found research sponsored by drug companies was less likely to be published or presented than research funded by other sources. However, if the research favored a sponsor's product it was more likely to be reported, published, and/or presented. These findings were applicable across a wide range of drugs, drug classes, diseases and time periods, regardless of the type of research being assessed.

It is also important to note that exploitation of global south nations is common in drug response trials for Western companies, as members of impoverished communities are often used as trial subjects [9]. Here one can question what this says about class, race and gender, as subjects are often poor, non-white and female.

Scientists that speak out against pharmaceutical research often find themselves under attack by their employers, colleagues as well as other private funding organizations. One example is the case of Steven Nissen, a physician and whistle-blower who spoke out against the pharmaceutical company GlaxoSmithKline. His case demonstrates the strong internal and external pressures scientists in private funded R&D face [11].

Strategies for Moving Forward and Strands of Inquiry for Future Inquiry

The United States is a capitalist society and the culture of this society is reflected in the ways in which science and technology are used and developed. Science, technology, research and development are profit driven enterprises [3], [5], [9]. Science is used as a political tool [2], [10] and often can be used as a means of observing power relations between nations [2], [9]. However, this doesn't mean that strategies for producing a new form of social scientific development have not been attempted in the past or should not be explored in the future [7], [12].

Future inquiries could take several directions including suggestions for dealing with biased research, a reemergence of a new scientific left and the incorporation of community participation in the construction and understanding of scientific knowledge. While suggestions for dealing with biased research [7] and the possibilities of a new scientific left [12] are touched upon in the readings covered in this guide, the importance and breadth of these topics makes them worthy project in their own rights and, as Donna Haraway would say, another pair of threads to pulled in the tangled ball of yarn that is the cultural analysis of science.

[2] Dickson, D. (1988). *The New Politics of Science*. Chicago: University of Chicago Press.

- During the 1980s financial support given to science was cut back by the administration in every field of public spending except for defense and the development of new weapons systems.
- Financial support to defense technology has been justified by administrations as a necessity to insure stable peace.
- Science and technology research have been used by administrations as tools in foreign policy.
- Science and technology has been used both in practice and principle as a means of creating and strengthening political alliances.
- In the 1970s and 1980s foreign scientists were banned for US conferences and research projects.
- Scientific knowledge has come to be viewed as a commodity, as in the example of ICL, a British computer manufacture that was required to obtain an export license to recruit US scientists.

[3] Levins, R. & Lewontin, R. (1985). *The Dialectical Biologist*. Cambridge: Harvard University Press.

- Modern science is described as a product of capitalism.
- Science (positivistic thought) was used as a means of fighting against the feudal system.
- Scientific research that advances cutting edge technology is necessary in a capital state for the development of commercial, military and global power.
- Research has become a business investment and is often the first to be cut when corporations suffer economic setbacks.
- Scientific researchers are a form of “labor” within the structure of a corporation and are subjected to production costs and managerial control and supervision.
- Scientists are “produced” and therefore are the creation of their experiences, education and other flexible social trends.
- In a capitalist society, science is specialized and compartmentalized.

[4] Lexchin, J., Bero, L. A., Djulbegovic, B., & Clark, O. (2003). *Pharmaceutical Industry Sponsorship and Research Outcome and Quality: Systematic Review*. *British Medical Journal*. Retrieved on February 8, 2009 from

<http://www.mindfully.org/Industry/2003/Pharmaceutical-Industry-Sponsorship31may03.htm>

- This study found research funded by drug companies is less likely to be published or presented than research funded by other sources.
- This study provided evidence that research favoring a sponsor’s product is more likely to be reported, published, and/or presented.
- These findings were applicable across a wide range of drugs, drug classes, diseases, and time periods regardless of the type of research being assessed.
- This study provides evidence of the social dimensions interwoven in research and knowledge with regard to privately sponsored pharmaceutical research.

[5] Mirowski, P. & Sent, E.M. (2008). *The commercialization of science and the response of STS*. In E. Hackett, O. Amsterdamska, M. Lynch, and J. Wajcman (Eds.), *The*

***Handbook of Science and Technology Studies (3rd ed.)* pp. 635-689. Cambridge: MIT Press.**

- Funding and organization have shaped the content and conduct of science throughout history.
- Modern commercialized science is vastly different from the science of previous eras.
- International agencies encourage commercialized-standardized research, development and institutions, which are driven by profit making motives.

[6] Noble, D. (1977). *America By Design: Science, Technology, and the Rise of Corporate Capitalism*. New York: Oxford University Press.

- The difference between modern science and science of the past is not the presence of technology but rather the means by which modern technology has come to define contemporary society.
- Forces of production and social relations fundamentally intersect, are interwoven and are interrelated.
- Technology is a social process.
- To illustrate this claim, Noble uses the example of the reciprocal relationship between corporate engineers and their allies within the academy. He explores the methods they employ to transform the objectives and structure of technical based institutions.

[7] Parkinson, S. (2004). *Corporate Influence on Science and Technology: Speech*. Retrieved on February 2, 2009 from <http://www.sgr.org.uk/SciencePolicy/SpeechGreenParty004.htm>

- Methods large corporations use to influence research and development include funding in-house research, funding research institutions, funding NGOs, public-private partnerships, placing company representatives on academic research councils, and pressuring scientists who obstruct commercial agendas.
- Industrial influences produce conscious and unconscious biases, therefore impacting the research conducted, the scientists conducting the research, and the results of the research.
- Suggestions for dealing with biased research include the development of existing technology, emphasis on non-technical solutions to social problems, and interdisciplinary research.

[8] Peterson, R. (1990). *Symbols and Social Life: The Growth of Cultural Studies*. *Contemporary Sociology*, 19(4), pp 498-500.

- “Oversimplifying the range of usages, one may say culture is used in two quite different ways, one deriving from anthropology and the other deriving from the humanities via the sociology of knowledge tradition. The first sees culture as codes of conduct embedded in or constitutive of social life. In this sense scholars may speak, for example, of the culture of a nation, a class, a corporation, a gang, or a scientific research laboratory. Here culture is to social structure roughly what the genetic code is to a species of living organisms. Such cultural codes may be discovered in ethnographic observation, attitude surveys, patterns of cultural choice, or the content of analysis of documents. The second general perspective sees culture in the symbolic products of group activity, be they those of artists, religionists, scientists, lawyers, taste makers, the folk, the mass media, and the like. In this perspective culture represents the symbols that people use to encode and convey various forms of information: knowledge, power, authority, affect, merit, beauty,

and virtue. Such symbolic elements also serve individuals and groups to identify those of like kind and to mark distinctions from others. Scholars employing this usage of culture focus on how such symbolic codes are produced, what they teach, and how they are used in the competition between classes and collectivities ranging in size from nations to scientific research laboratories” (p. 498).

[9] **Rajan, K. S. (2006). *BioCapital: The Constitution of Postgenomic Life*. Durham: Duke University Press.**

- Science, in capitalist societies, can be understood as a business plan.
- Biotechnology can be analyzed as “speculative capitalism,” with emphasis on hype, vision and expectations of future returns.
- There is a co-production of the social and scientific on a global scale.
- Exploitation of global south nations is common in drug response trials for Western companies.
- “Scientific truth” can be seen in a cyclic relationship with those who have the power to produce and continue that power.

[10] **Shulman, S. (2006). *Undermining Science: Suppression and Distortion in the Bush Administration*. Berkeley: University of California Press.**

- Political administrations have the power to manipulate the process through which scientific knowledge is released and applied in any society.
- Methods of manipulation include dismantling advisor committees, censorship, not seeking independent scientific advice and nominating individuals with clear administrative agendas to specific science related posts.
- Shulman explores the case of US Climate Change Science program where data exposing global warming was both suppressed and distorted by governmental spokespersons.
- Shulman also examines the cases of the FDA’s attempt to silence physicians who attempt to report the dangers associated with FDA approved drugs.

[11] **Washburn, J. (2007). Science’s worst enemy: Corporate funding. *Discover Magazine*. Retrieved on February 2, 2009 from http://discovermagazine.com/2007/oct/sciences-worst-enemy-private-funding/article_view?b_start:int=0&-C**

- Washburn cites the case of Steven Nissen, a physician whistle-blower who spoke out against the pharmaceutical company GlaxoSmithKline and was attacked by colleagues with financial ties to the drug industry.
- Washburn also calls attention to the case of the BP announcement of a 10-year, \$500 million research alliance with UC Berkeley and University of Illinois at Urbana-Champaign.
- One of the most troubling dilemmas for scientists is weighing the benefits of private funding (research opportunities, conversion of knowledge into practice, jobs, economic growth) against the challenges (tainted research, limited studies, suppression of the truth.)

[12] **Werskey, G. *The Marxist Critique of Capitalist Science: A History in Three Movements?* Retrieved on February 15, 2009 from <http://human-nature.com/science-as-culture/werskey.html>.**

- Despite the weakness of Werskey's history with regard to women's involvement in the British Scientific Left and the Radical Science Movement, he provides a detailed account of these movements through a Marxist perspective.
- By viewing history through Marx's ontology one can make the points: "History is the motor of technology," "Technology is the embodiment of values in artifacts," Nature is a historical category," "Natural science is also a historical category, a human relation, as is objectivity."
- "Science Wars," and cultural scientific ideology grew out of political confrontations and alliances.
- Globalization, lead by US transnational corporations, restructured the division of labor, production and distribution; therefore, widening inequalities based on class, race, nation and gender.