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DIFFICULTIES IN UNDERSTANDING THE AUTONOMY OF SCIENCE: CONSEQUENCES OF STATE SOVEREIGNTY

Within his article *Science and Trans-science* (1972), Alvin Weinberg outlines his conception of trans-science as being a natural consequence of problems arising from the interaction between science, technology, and society. The solutions to the problems "hang on the answers to questions which can be asked of science and yet cannot be answered by science." (Weinberg 1972, 209) These trans-scientific questions take various forms. One set of questions is related to matters to which science cannot feasibly obtain an answer. One such a question would be: "What is the long-term effect of low-level radiation on biological organisms?" In principle this experiment could be conducted. Weinberg states, that if we wanted to have a 95% confidence level in its results, the experiment would require 8,000,000,000 mice. While such an experiment could be theoretically conducted, it remains unfeasible given society's limited resources. (Weinberg 1972, 210) The second set of trans-scientific questions is a situation where the subject matter is ill captured by science. Weinberg gives sociology as an example of this. The main reason for this is that, while in physics individual atoms can be described by general laws of physics and are homogeneous with one another, individual persons acting in society are more chaotic and are heterogeneous from one another, making generalizations less useful and less scientific. (Weinberg 1972, 212) The third set of trans-scientific questions is axiological in nature and asks "why" rather than "what", establishing the methodology of and priorities within science. These sorts of questions are matters of "scientific taste" rather than

questions of science. It is this set of axiological questions that we are interested in for the purposes of this paper.

The answers to these questions, while bearing upon the practice of science, do not belong to any specific scientific discipline. (Weinberg 1972, 213) For example, we can ask a question of priority "What data is relevant to this experiment?" A second question we can ask is, "Is this sort of research good for society?" A third question can be, "How do we promote scientific research?" Fourthly we can ask, "Should scientists prefer paradigm shifting theories or theories that support our current paradigm?" These sorts of questions highlight four main categories of values: 1) science's inner value, 2) the value of science, 3) values for science, and 4) values brought into science. The inner values of science include truth (viz. what is true or what counts as a fact) and justification (i.e. what degree of error is acceptable). The "value of science" includes what is the good of science for society, and general questions about science's instrumental value. The values for science are those values that serve science itself. These would include the allocation of grants, patent protection laws, and the establishment of research institutions. Finally, values brought into science include matters of how to prioritize research (namely, should we invest in the development of a blue rose or a cure for AIDS) and taste in scientific procedure (from emphasizing research that advances scientific knowledge to the Soviet policy of Lysenkoism). All of these values need to be determined for the well functioning of science and how they are determined affects scientific autonomy.

One approach to resolving these axiological questions is to leave it to the scientist to sort out. This would be in the lines of a model that uses a strict autonomy of science, or linear model, that is advocated for by Vannevar Bush in his report to the President of the United States *Science the Endless Frontier* (1945). Such a model suggests that society should provide science with the support needed to independently pursue various self-policed lines of research. This research will then build up our well of basic research that will in turn result in both social and economic benefits for society. (Briggle and Mitcham 2012, 217)

Carl Mitcham and Adam Briggles, however, note that difficulties arise when trying to resolve these axiological questions with idea of strict autonomy for science. They question the direct connection between *good science* (that is to say epistemologically sound science) and science that is *good for society*. Mitcham and Briggles present three sorts of science, while still being *good science*, that are questionably *good for society*. One example would be spending society's limited resources on trivial knowledge like a cure for balding. Secondly, there is dangerous knowledge like learning how to create a weapon out of a deadly virus or how to create an atomic bomb. Thirdly there is controversial knowledge that poses moral dilemmas like the use of data from NAZI human experimentation or more contemporaneously embryonic stem cell research. (Briggle and Mitcham 2012, 217)

Looking specifically at the issue of embryonic stem cell research, they note that there "is no bright line between science and its many social contexts." (Briggle and Mitcham 2012, 212) Science does not operate outside of the confines of society and the value of embryonic stem cell research is not solely a scientific question. While science can determine if embryonic stem cells can be used in this or that fashion, there are other questions that it cannot answer. There are moral / religious proponents and opponents to the use of embryonic stem cells. There are questions of how to finance this research and subsequent marketability of products derived from this research. Furthermore, there are political questions on whether to promote or prohibit this sort research. Society has an interest in both the values inserted into embryonic stem cell research and the far-reaching results of it. Drawing upon Weinberg's concept of "Big Science" captures this interest. This big science is the sort of science that needs big money, big staff, big equipment, has a big impact on society,[1] and need the direction, support, and subsequent control by socio-political institutions. (Briggle and Mitcham 2012, 218)

[1] Notably such "Big Science" projects would include the Manhattan Project, The Apollo Space Program, The Large Hadron Collider, or the International Space Station.

Given this sort of interest we are then led to consider the nature of this connection between science and society. David Guston, in his article *Forget Politicizing Science. Let's Democratize it!*, acknowledges that science has been deeply politicized and rather than confronting it we should ensure that science becomes more democratic. He is quick to note that by democratic he does not "mean settling matters of Nature by plebiscite." (Guston 2004, 25) Rather, he argues that the determination of the axiological values of science should be open to democratic principles of accessibility, transparency, and accountability. Furthermore, science should be participatory, relevant, and popular in addition to maintaining its epistemic rigor. (Guston 2004, 25 -26) Weinberg agrees with this assessment noting that in "issues that effect everyone, and not just the scientists, and therefore everyone, has a right to be heard." (Weinberg 1972, 218) In matters of both public and science policy, the role of experts is instrumental to forming good policies, but this should not come at the cost of ignoring non-experts who are nonetheless affected by these policies. This acknowledgement of people, who have various degrees of scientific knowledge, in the formation of policies, is a natural consequence of systems of governance that rely upon popular sovereignty for their legitimacy.

Such consequences bring us to our final point. Provided that the axiology of science is determined by society at large, and not by scientists themselves, we should examine how this determination is expressed. This presupposes that we are working within a framework of society that operates with democratic principles resting upon popular sovereignty. Genevieve Nootens, in her book *Popular Sovereignty in the West: Polities Contentions and Ideas*, provides description of popular sovereignty as a system that rests:

> on the idea that the people rule (and ought to rule) and legislate for themselves, although indirectly. It is indirect in two ways: one the people are represented as forming one national community; and they rule through their representatives. The ways representation in the legislative body relates to the representation as one national community varies, though. In other words, in the West, the idea of popular sovereignty came to be closely identified with democratic

> self-rule, namely, the normative requirement according to which law is legitimate insofar as it is the product of the people's decision-making. (Nootens 2013, 73 - 74)

Nootens' definition I take to be a fair representation of the current state of affairs of popular sovereignty, and of the West in general. If we take this notion of sovereignty seriously, we see that the people participate in (and legitimize) the formation of science policy through their representative operating in the locus of the state.

With this understanding, the state in turn may make science policy decisions that can determine the values within the axiology of science, as an expression of the self-rule of the nation expressed by democratic means. Additionally, this expression maintains its legitimacy in directing science, provided that it is acting in accordance with the collective will. Here we can see that the autonomy of science, in the strong sense of being able to determine its own axiology, no longer functions. For science, while valuable, has become a subgroup within society (and the state) and not a distinct part or appendage. Moreover, science, as a subgroup, is subject to the collective "democratic self-rule" of the society within which it is operating, or in short the state's science policy. Moreover, this policy sits on the shelf of other policies adopted by the state, *viz.* its energy policy, education policy, defense policy etc. It is important to note that a semblance of autonomy may exist, but it is circumscribed in an expanding or contracting grant given by society through the state.

In conclusion, we have seen that the old model for the function of science, namely the idea of the strong autonomy of science cannot function within the state. This stems from problems in the understanding of the autonomy of science within the context of sovereignty, and society. If we have a state the makes claims of the self-rule of the collective and all its subsidiary parts, then science, as a part, must too be regulated by such a state. Further considerations on this

topic include a flushing out of the link between our conception of state sovereignty and its influence upon the axiology of science.

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ABSTRACT

The importance of the autonomy of science is generally assumed to be good for the proper functioning of science. Yet, when we examine the notion more closely, various difficulties present themselves and cloud our understanding of this important concept. One such complication presents itself when we examine the relationship between science and the state. When examining the relationship between science and the state, there is an area of overlap that is called by Alvin Weinberg as trans-science. This concept contains within it an axiology of science that has bearing upon the scientific process itself. This leads us to ask, who determines the values in this axiology of science? In this paper I will argue that the state takes precedence in determining these values in the axiology of science which impacts science's autonomy. To do this, I will first present an outline of what the concept of trans-science is. Next I will present the axiology of science and ways of determining it. Finally I will present the State's role in determining these values.

KEYWORDS: science, autonomy, the state

SŁOWA KLUCZOWE: nauka, autonomia, państwo