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Defining Science: A Group Discussion

Carolyn Singer
Parkland College

Carrie Singer

Beatty/Rodriguez

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Reflections on This Thing Called Science

Several months ago, when asked to write an essay regarding my opinions of what science is and how scientific research is performed, I gave what now appears to be nothing short of a very brief and very vague description. I defined science as a method with which to gain a more thorough understanding about the way things work in the world around us. I still feel that this is a statement of general truth in regards to the nature of science, however vague it may be. Through reading A.F. Chalmers' "What is This Thing Called Science?" I have been able to build upon my definition immensely. After rereading my initial essay, I can see how much insight I have gained through participating in this series of discussions. I feel that many of my original ideas about science were not so much denied by Chalmers as they were expanded upon. Chalmers' ideas are far more in depth and added much more perspective to my own thoughts on the subject.

In the simplest terms, science is a system used to make observations and predictions about the world, but it is incorrect to classify it as one single method. My original essay pinpointed the scientific method as being the one and only process as a means of conducting scientific research and obtaining data. I noted that the scientific method involves forming a hypothesis, performing experiments in order to obtain data and finally drawing conclusions based upon said data. I did not previously take into account that there may be more than one approach used to carry out research in a scientific manner. After reading this book, I have learned

that there are many differing approaches that may be utilized when conducting scientific research. Researchers may use induction, deduction, falsification or other methods to collect data and either confirm or reject their initial hypothesis.

In addition to clarifying and building upon some of the things that I already knew, Chalmers also poked lots of tiny holes into some of the other things that I apparently only thought I knew. For instance, it is widely acknowledged that science is based on facts, but what it is that actually constitutes a fact is a far hazier situation. Previously, I believed that a fact was merely a statement that could be proven to be true in one way or another and that scientific observations which can be supported by multiple experimental trials could be referred to as facts interchangeably. Chalmers puts this thought to rest when he writes that "[T]wo normal observers viewing the same object from the same place under the same physical circumstances do not necessarily have identical visual experiences, even though the images on their respective retinas may be virtually identical" (5). What Chalmers is saying with this statement is that an observation cannot rightly be stated as fact because in order to make an observation, the observer must draw upon their own previous knowledge and experiences. Because of this, two different observers could make contradicting statements about the same object, each statement true for that particular observer, but perhaps not to the other.

This brings about another example of why many statements that are widely recognized as fact are not necessarily true. In my original essay, I indicated that through use of the scientific method and comparison of data from other scientists, definite conclusions could be made. I now see that accurately confirming results is no simple task. I did, however, note that comparing data to that of scientists from another field may lead to potentially major discoveries. This statement is on the right track, though probably not exactly correct. While reading, I found myself going

back to what I picked out as one of the major ideas of the book, that anything that can be "proven" to be "true" can only uphold its reputation as a valid explanation until something better comes along to replace it, be it better technology or a fresh perspective. To clear up this matter, Chalmers brings Heinrich Hertz into the discussion. After much research involving cathode rays, Hertz determined that these rays were not deflected when subjected to an electric field, and thus, were not beams of charged particles. This assumption was consistently shown to be the case in Hertz's experiments. It was not until technological improvements concerning the vacuums came about that J.J. Thomson was able to reject Hertz's conclusions in lieu of a better explanation. "With an improved vacuum, and with a more appropriate arrangement of electrodes, Thomson was able to establish the deflections that Hertz had declared to be non-existent" (32). Had advancements in technology and understanding not paved the way for Thomson's discoveries, we would likely still not consider cathode rays to be beams of charged particles, as there would be no reason to believe otherwise.

The idea that science is not rooted in fact, at least according to my previous understanding of the definition of the word, is the idea that stuck with me the most from our discussions. The nature of science, as I see it now, is not a solid description of the facts, but rather an ever changing and improving account of how and why things are the way they are. Many of our discussions revolved around the idea that nothing can effectively be proven, only disproven when a better explanation makes an appearance. Even Chalmers refers to realism as "not involv[ing] the claim that we can come face to face with reality and read off which facts are true and which are false" (231). This statement seems logical enough considering everything else that Chalmers has opened my eyes to regarding what can be considered to be true or false.