

REFLECTIONS ON MY CHANGING ATTITUDE TOWARD SCIENCE

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I have always been a scientist at heart and have longed to aid in the establishment of absolute truths via the methodologies of science. I have, however, always lacked a grasp on the bigger picture of science: the meanings of being a scientist, the implications of scientific discoveries on everyday life, and how the subject itself may change in the future. Previously, I was unable to look upon science from afar and understand that it, just like many other subjects, is a creation of humankind and thus subject to everything human. After taking this course, I am now able to look at science from a different perspective, one that takes into account the human hands that shaped science. This course and its related discussions ultimately challenged my views on the development of science, its relationship with religion, and the goals and implications of science within the larger social structure.

Mostly due to the petty arguments between amateurs of various scientific fields, I was previously under the impression that various fields of science developed independently. That is, the fields of mathematics, biology, chemistry, physics, and others developed from separate ideas and separate groups of people and only later borrowed thoughts from each other. This was, however, repeatedly shown not to be the case. For instance, when Newton was attempting to solve problems of planetary motion, he simultaneously developed a form of calculus in order to aid his calculations. Instead of the independent formation of Newton's classical physics and calculus, they were formed hand-in-hand, physics demanding new expressions of mathematics and mathematics answering those demands with elegant solutions. Further than this, the development of Newton's classical mechanical physics was directly tied to the developments of astronomy and astrophysics. For instance, Huygen's theories and speculations regarding centripetal force played a direct role in the development of Newton's theory of universal gravitation.¹ This simultaneous development and mutually beneficial relationship between fields did not only exist in physics, however. Seemingly unrelated fields could not

1 Richard Westfall, *The Construction of Modern Science* (New York: Cambridge University Press, 1971), 145.

exist without each other, as they sparked interest in thought that caused a new perspective, which ultimately drove the development of a new field. For instance, it is often noted that the advent of Biology was a direct outcome of the curiosities resulting from Geology.² Geology allowed people to see how things changed over time, causing people to look at the development of life from an entirely new perspective. Of course, this relationship between fields can also be seen in the study of chemistry, thermodynamics, and electromagnetism, which are directly paralleled with physics and scientific thought.

The development of the field of social sciences challenged my views above all, however. Previously, I thought the social sciences to be laughable due to their lack of strict mathematics and subjectivity in interpretation. However, as the eighteenth century Anne Robert Jacques Turgot explained, the social sciences were simply an “objective science of society, founded on the constants of human nature and the mutual needs of all men and women.”³ In short, the social sciences developed through a desire to apply the ideas of “hard” sciences like physics to the social realm. Indeed, the pioneers of this new science, John Locke, Montesquieu, and Jean-Jacques Rousseau, all developed ideas that applied the methodologies of other sciences into the studies of society.⁴ The social sciences of today also very much reflect the scientific way of thinking. As historian Thomas Hankins argues, the fact that all of these studies could be included within a single encyclopedia, namely Diderot's *Encyclopédie*, emphasizes the interconnectedness and tight relationship between all fields of science.⁵

Echoing the popular debate of the current time period, I previously believed that today and throughout its existence, science and its ideas were mutually exclusive with the ideas of religion. If one subscribed to the ideas of science, they simply could not subscribe to the ideas of religion. However, this was simply not the case as many scientists had religious beliefs that influenced their scientific

2 Tal Golan. Lecture.

3 Thomas Hankins, *Science and the Enlightenment* (New York: Cambridge University Press, 1985), 159.

4 Ibid., 175.

5 Ibid., 165.

theories. Perhaps one of the most important discoveries of seventeenth century astronomy was the Copernican model of our galaxy, which placed at its center the Sun instead of the Earth. Although this completely went against the ideas of the church, Copernicus' model still maintained the Ptolemaic system of planetary motion, which stated that all bodies must move in perfect circles because God would create nothing less than a perfect circle.⁶ Thus, although Copernicus' model was seemingly the antithesis of the religious beliefs of the time, his own religious beliefs influenced the structure of his model. This very same implementation of religious views into scientific theory can be seen throughout history. Isaac Newton, for instance, in his development of the three universal laws of motion, believed that there must be an external force which occasionally “pushed” the planets, keeping them in their set motion. This force, he believed, was one of God.⁷ Thus, even the inventor of the laws that we take for granted today was influenced by religion when developing his theories. Not only did scientists incorporate their religious beliefs into their scientific theories, but the church also incorporated scientific findings into its own operations. For instance, the Gregorian Calendar, which was developed to keep track of important religious dates, was based off of moon phases which could only be correctly predicted using the latest models of science.

Given this, it seems odd that I would previously think science and religion to be so antagonistic with one another. However, historian William Coleman sheds some light on the issue with his discussion of evolution. Although most scientific theories proved to be opposing the beliefs of the church, many scientists attributed even further unknown phenomena with the supernatural. This was especially true in biology, where studies and experiments described the functionalities of plants and animals, but always failed to explain why the human species seemed to be intellectually superior to all other species. To answer this, scientists turned to religion. Thus, the church approved. However, as Coleman mentions, this viewpoint changed with the ideas of Darwinian natural selection. Since natural

⁶ Peter Bowler and Iwan Morus, *Making of Modern Science* (Chicago: University of Chicago Press, 2010), 48.

⁷ Tal Golan. Lecture.

selection argued that humans were no more than an evolved primate, just as all other living things had evolved from another living thing, it displaced humankind as a naturally superior species, thus contradicting almost all religious theories.⁸ Therefore, my misunderstanding of the relationship between science and religion was probably due to the differences in beliefs prompted by natural selection. Even with natural selections' powerful contradiction of religion, proponents of natural selection still relied on religion to answer the larger questions, like the explanation of how the process of evolution initially began.⁹

Much like many practitioners of science, I previously echoed the beliefs of Richard Dawkins, where science eliminates “private prejudice” in favor of “publicly verifiable evidence.”¹⁰ Thus, science could be nothing short of a continual objective search for truth. However, looking at science from an outside perspective shows that much like many other human-created things, science is simply an outcome of the cultural and societal period. The prime example of this is emphasized within the creation of science as a whole. The key attribute of scientific thought is its push for skepticism – all scientists should be skeptical. This way of thinking was absent from the minds of humankind until the late fifteenth century, where people finally realized that they are not inferior to the ancient Greeks and Romans who existed hundreds of years before them.¹¹ This change in attitude was reflected in all matters of society, as people began to think for themselves. This, in turn, created science. As science developed, evidence that science is simply a reflection of current social trends can be seen within each new theory. For instance, the aforementioned presence of religion in many scientific theories is a result of the important role that religion held within society during the time of their postulation. This can be seen more clearly in the scientific theories that have developed during the past two centuries, when the

8 William Coleman, *Biology in the Nineteenth Century* (New York: Cambridge University Press, 1971), 58.

9 Ibid., 74.

10 Richard Dawkins, *The Enemies of Reason*, directed by Richard Dawkins (2007; United Kingdom: Channel4, 2007.), DVD.

11 Tal Golan. Lecture.

ideas of capitalism and the struggle for individual “survival” were popular throughout society. It was these attitudes, historian Stephen Gould claims, that prompted the era of “scientific racism”, where fields such as eugenics and craniology gave people empirical and seemingly rational ways to discriminate against one another.¹² Further, the idea of natural selection seems to be an exact reflection of the attitudes an individual would feel within daily societal life. Just as one fought to survive and better the socioeconomic status of their offspring within Victorian capitalistic society, one fights to survive and better the biological standing of their offspring in the entirety of life. Being able to look at science in this way makes it very clear why science today acts like it does. Currently, with the advent of the Internet, where copious amounts of data are ever-present and easily attainable, people are constantly looking for ways to apply this data. Because of this, science is once again changing into something that reflects the societal climate. Indeed, as historian Michael Gibbons claims, science is transforming into something where knowledge is “produced in the context of application.”¹³ Moreover, societal and cultural beliefs not only influence the formation of scientific theories, but also directly determine the popularity of the theories.

Overall, this course gave me the opportunity to look at science from an outside perspective, analyzing why certain things happened instead of simply knowing that they did happen. Ultimately, this way of analysis challenged my views on the development of science as it developed as a unit instead of as many differentiated fields; its relationship with religion, as many theories were influenced by religion and religion was influenced by scientific theories; and the reasoning behind the formation of certain theories, as they were more reflections of societal and cultural beliefs than pure quests for truth. This challenging not only changed the way I think about science, but all things created by humans as well. Instead of looking at things in terms of their appeared purpose, I will now look at things in the context of their social and cultural background, which will provide powerful insight into the reasoning

¹² Stephen Gould, *The Mismeasure of Man* (New York: W. W. Norton & Company, 1996), 57.

¹³ Michael Gibbons, *What Kind of University?* (Victoria University of Technology, Lecture, 1997), 3.

behind their formation.

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