

Scientific revolutions: thomas kuhn's theories of science

[History](#), [Revolution](#)



The Scientific Revolutions and its Structure

In this essay I am going to discuss what the scientific revolution was and who was of importance at that time. I am also going to discuss more about Thomas Kuhn's theories of science and discuss Karl Poppers theories of science. I am also going to give my outlook on the scientific revolution, the problems that Khun and Popper faced during their discoveries, and the most talked about theories from Kuhn through out this essay.

HISTORICAL CONTEXT

The Scientific Revolution had many great minds that made an impact at the time and continued to where we are today in science, medicien, and technology. Some of the important thinkers of the Scientific Revolution were; Andreas Vesalius, Giordano Bruno, Antonie van Leeuwenhoek, William Harvey, Robert Boyle, Paracelsus, Tycho Brahe, Johannes Kepler, Nicolaus Copernicus, Francis Bacon, Galileo Galilei, Rene Descartes, and Isaac Newton. They all had one thing in common being very smart thinkers and changing the way for the discovery of modern science.

A influential philosopher of science came to be known in the twentieth century. Some scientis say he was the most influential one of time. His name is Thomas Kuhn (1922-1996) born in Cincinnati, Ohio. He was and still is known for his book *The Structure of Scientific Revolutions*. This book not only talks about the " Paradigm Shift" (which I will bring up later in this essay) but this book also changed the way mankind thinks about how mankind attempts to understand the world in an organized and structured way.

Another influential philosopher of science in the twentieth century was Karl Popper (1902-1994) born in Australia. He was well known for his theory of Criterion of falsifiability. This means that, in the philosophy of science, a standard of evaluation of putatively scientific theories, according to which a theory is genuinely scientific only if it is possible in principle to establish that it is false (Britannica).

Now both philosophers explained how the philosophy of science was bias towards physics by scientist. Karl Popper explained that no amount of data points could really prove a theory. However, a single key data point can disprove it. A few theories that help this falsification were quantum mechanics and relativity. As science evolves falsification become less reliable and more complicated.

A main reason falsification has become less reliable is that the modern science is based on models and not theories. Modern science has test that are ran, data that is collected, retested, and test that are solved and/or gives us prof and facts. These models can be retested and have different variables added to the models, which then lead to different results.

When it comes to Thomas Kuhn's theory of scientific progress better know as a " paradigm shift" there was an objection to it by the scientific community. Philosopher Arun Bala accused Thomas Kuhn of having being biased towards the Western civilization. Thomas Kuhn responded in writing:

"[O]nly the civilizations that descend from

Hellenic Greece have possessed more than the most rudimentary science. The bulk of scientific knowledge is a product of Europe...No other place and time has supported the very special communities from which scientific productivity comes." (Kuhn 12).

There were others who question and accused Thomas Kuhn. However, I enjoyed reading what Thomas Kuhn wrote to Philosopher Arun Bala. I felt Thomas Kuhn was polite, forward, and truthful in his words. Kuhn believes the paradigms are incommensurable, even though they may provide different explanations of the same phenomenon, such as the different definitions of mass in Einsteinian versus Newtonian physics (Adams 17).

Thomas Kuhn's scientific theories had limitations because his theories could not account for past scientific advancements that happened outside of the "paradigm shift".

Now lets talk about Thomas Kuhn's theory of how the "paradigm shift" and came to be. Thomas Kuhn talks about normal science, but what really is normal science? *Normal science* " means research firmly based upon one or more past scientific achievements, achievements that some particular scientific community acknowledges for a time as supplying the foundation for its further practice" (Kuhn 12). However there can be a shift in normal

science meaning new theories and/or paradigms can be allowed. When this occurs a shift takes place with either theory or fact.

When this occurs there is a cycle in a paradigm shift; first is the pre-science, second is the normal science, third is the model drift, fourth is the model crisis, fifth is the model revolution, and last it the paradigm change. The one cycle that I find the most interesting is the model crisis. The model crisis is when the model drift is broken. It can no longer be a reliable guide to solving the problem.

The other steps were also of importance for instance pre-science is a non-workable step. Normal science is when there is a baseline for understanding a theory that works. Model drift is where we start to understand what is going on in the experiment but the end results cannot be explained and the results do not make sense. Model revolution begins when a new model is thought of because the recent one did not work. Finally you have the paradigm change where a new idea emerges from an old one, and a shift occurs.

I find this to hold true in real life science experiments. As Thomas Kuhn said I have argued so far only that paradigms are constitutive of science. Now I wish to display a sense in which they are constitutive of nature as well (Godfrey-Smith 03). This then leads to Thomas Kuhn's "paradigm shift" theory to continue to be in favor of science experiments today. Thomas Kuhn said "he was convinced that not only are there scientific revolutions but also that they have a structure" (Hacking 12). Which then leads me back to the

Scientific Revolution, because these brilliant philosophers' would not have made great advancements in science like they did.

The Scientific Revolution was and is the biggest shift in the world of science since modern science. There were developments in astronomy, mathematics, chemistry, biology, and medicine that changed the views of society. Britannica's definition of the scientific revolution is drastic change in scientific thought that took place during the 15th, 16th, and 17th centuries (Britannica). This unfolded in Europe around 1550-1700 this was towards the end of the Renaissance era. This was the improvement for how we thought and how the world was ran.

Nicholas Copernicus (1473-1543) was the person to start the Scientific Revolution with his theory that the sun is at the center of the Universe and that the Earth is on an axis that spins around once daily. Then came Isaac Newton (1642-1727) whose theories were on Universal Laws. In mechanics, his three laws of motion, the basic principles of modern physics, resulted in the formulation of the law of universal gravitation (Britannica). Towards the end of the eighteenth century the scientific revolution community name this era " Age of Reflection".

These scientific views changed the way society worked at that time. People began to question many things even what the leaders were telling them, some even questioned religion. This gave people a sense of freedom of thinking outside the normal every day life. Along with the good points of the Scientific Revolution there was some theories and discoveries that created

war, “ It is stated that the scientific revolution has made wars irrational and deprived diplomacy of its most important tool, which is plausible war threats, culminating in the discovery of nuclear bombs and ocean-spanning missiles” (Rabinowitch 63). Unfortunately there will always be people in this world that will use science for advancement and war. Hopefully as we evolve we can move past science being in the wrong hands of people.

CONCLUSION

The philosophers and the scientist, men/woman who lead the way for the scientific revolution made great leaps and bounds in the world of science as we know today. If it was not for these men/women the world would not be where we are today with out technology and science discoveries. What if Nicholas Copernicus never discovered that the sun is centered? Think about the ripple in our time. Where would we be at today? I believe things happened and happen for a reason especially when it comes to the field of science and technology. I look forward to seeing in my lifetime where science will lead us the next.

I feel there is so much more to learn from the philosophers and scientist, plus there are so many more that contributed to the Scientific Revolution. I wonder and have a gut feeling that there were people from those times who thought of these theories and experiments to have someone else take credit for them. If we ever found out the truth I am sure there would be a shift in the science world, as we know. Thank you for taking the time to read my essay I hope I was able to shed some light on the Scientific Revolution,

Thomas Kuhn, Karl Popper, and their theories that made them famous both positive and negative in the science world.

Notes

1. Please note that any direct quotes from Thomas Kuhn's texts are written in their original form, which may contain grammar mistakes according to twenty-first century grammar rules.
2. I feel that I was trying to get out some main points of the Scientific Revolution, and Thomas Kuhn and I feel that it was so much more than what I talked about.

Works Cited

- Bird, A. (2018, October 31). Thomas Kuhn. Retrieved from <https://plato.stanford.edu/entries/thomas-kuhn/>
- Godfrey-Smith, Peter. *Theory and Reality: An Introduction to the Philosophy of Science*. University of Chicago Press, 2003. EBSCOhost, search. [ebscohost.com/login.aspx?direct=true&AuthType=ip&db=nlebk&AN=324622&site=ehst-live&scope=site](https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip&db=nlebk&AN=324622&site=ehst-live&scope=site).
- Hacking, Ian. "Revolutionary Road." *New Scientist*, vol. 216, no. 2887, Oct. 2012, p. 28. EBSCOhost, doi: 10.1016/S0262-4079(12)62692-X.
- Kuhn, Thomas S. *The Structures of Scientific Revolutions*. Chicago, IL: University of Chicago Press, 2012.
- Adams, Alexander J. *Objections to Kuhn's theory of scientific progression*. Philadelphia, PA:, 2017. Retrieved from <https://hekint.org/2017/01/22/objections-to-kuhns-theory-of-scientific-progression/>

- Osler, M. J., Spencer, J. B., & Brush, S. G. (n. d.). Scientific Revolution. Retrieved from <https://www.britannica.com/science/Scientific-Revolution>
- Rabinowitch, Eugene. "Scientific Revolution: The End of History." *Bulletin of the Atomic Scientists*, vol. 19, no. 9, Nov. 1963, p. 9. *EBSCOhost*, doi: 10.1080/00963402.1963.11454553.
- Shapere, Dudley. "The Structure of Scientific Revolutions." *The Philosophical Review*, vol. 73, no. 3, 1964, pp. 383-394. *JSTOR*, www.jstor.org/stable/2183664.
- Solomon, Stephanie. "Kuhn's Alternative Path: Science and the Social Resistance to Criticism." *Perspectives on Science*, vol. 18, no. 3, Fall 2010, p. 352. *EBSCOhost*, doi: 10.1162/POSC_a_00013.