

The Change of Modern Science to a New Religion to the General Public after the Scientific Revolution

Ma Yau Ka
Science, Morningside College

Science and religion are important parts of human civilization. They both try to understand the world, while holding different principles. After the Scientific Revolution, the importance of science has risen drastically. It is threatening the statuses of many religions, as more and more people think that religions are blind beliefs that are not “scientific”. However, modern science itself has become a new religion to the general public. This paper aims at discussing the causes and mechanisms of this phenomenon. Firstly, important terms should be defined.

“Science” is “a systematic method or body of knowledge in a given area” (*The Free Dictionary*). Knowledge is achieved fundamentally by inductive method, which means passing singular statements into universal statements of scientific theories (Popper 3–4)¹. Then, existing theories are

1 Original text: “According to a widely accepted view . . . the empirical sciences can be characterized by the fact that they use ‘inductive methods’ . . . it passes from singular statements, such as accounts of the results of observations or experiments, to universal statements . . ., such as hypotheses or theories.”

tested deductively (9)², by evidence from observation and experimentation. If the results contradict with existing theory, the theory is falsified (10)³. Therefore, all statements in science are required to be falsifiable and testable (18)⁴.

“Religion” is “a cause, principle, or system of beliefs held with ardor and faith” (*Merriam-Webster.com*). Same as science, religions intend to explain the world by theories on a given area. However, religious theories are held by faith of believers instead of evidence. Therefore, religious beliefs need not be tested deductively, and is not necessarily rejected even if logically falsified. Hence, religious statements are not required to be falsifiable and testable.

“Modern science” here refers to the current system of scientific theories that has been generally accepted by the academia since the Scientific Revolution, based mostly on Western Science. Despite the scientific principles strictly adopted by scientists, to the general public, modern science has become more like a religion. I am going to further elaborate each difference between science and religion, then explain why and how modern science is inclined to the religious side. These differences involve I. Content of Theories and II. Attitude towards Theories.

I. Content of Theories—Falsifiability and Testability

A theory being falsifiable means that it is logically possible to be refuted by experience (Popper 18)⁵ from observation or experimentation, while being

2 Original text: “a hypothesis, a theoretical system, or what you will—conclusions are drawn by means of logical deduction.”

3 Original text: “But if the decision is negative, or in other words, if the conclusions have been falsified, then their falsification also falsifies the theory from which they were logically deduced.”

4 Original text: “These considerations suggest that not the verifiability but the falsifiability of a system is to be taken as a criterion of demarcation.”

5 Original text: “It must be possible for an empirical scientific system to be refuted by experience.”

testable means it is practically feasible to carry out such observations or experiments. Religious theories, as explained, are not necessarily falsifiable and testable. However, scientific theories must consist of falsifiable and testable statements.

Take Christianity as an example, “God always gives us what we pray for” is falsifiable and testable, as we can try praying as an experiment. If God does not give us what we pray for in the experiment, the result is negative and the statement is falsified. However, eschatology is neither falsifiable nor testable. If the Doomsday will not come, no matter how long we wait and observe, we cannot logically falsify the theory that “the Doomsday will come”.

Modern science is mostly concerned with the physical world (Sivin 227), which makes it falsifiable. For example, Newton’s First Law states that “[e]very body perseveres in its state of being at rest or of moving uniformly straight forward, except insofar as it is compelled to change its state by forces impressed” (Newton 67). It is possible to prove this law wrong if we observed an object experiencing no net force, but is neither at rest nor moving uniformly straight forward. To scientists, these theories are also testable as observations and experiments are feasible. However, to the general public, many theories are not practically testable, due to the following reasons:

i. Difficulty of Observation and Experimentation

Early science is mainly concerned with things that human can observe directly. For example, Aristotle’s model of elements consists of only four elements (earth, water, air, fire) that anyone can obtain easily (Lindberg 26). However, since the Scientific Revolution, scientific models have become much more complicated and precise, like modern periodic table with more than 100 elements, and precise astronomical predictions that cannot be easily measured.

Observation and experimentation on modern science often requires advanced equipment and procedures. For example, to test theories of quantum mechanics, scientists built Large Hadron Collider (LHC), which required collaboration of more than 8000 physicists and institutes from 85 countries. To the academia, these projects are feasible as long as time is given. However, to an ordinary individual, it is impossible to carry out such tests in lifetime.

ii. Increasing Amount of Established Knowledge

Under the rapid development and long history of modern science, total amount of knowledge in established theories has skyrocketed, such that it is impossible for an individual to understand all theories in a lifetime. Without understanding the theories, one will not know how to test them.

For the LHC example, one may argue that it is still practically possible for one to become a physicist and join the experiment, so as to test the theory personally. However, it takes a student at least 3 years to learn established physical theories, and almost a lifetime to become a physicist. It is practically impossible for one to specialize in every field. Therefore, an individual is only capable of understanding and testing a very small part of modern science.

II. Attitude towards Theories

Attitude towards a theory means the way we judge the theory. It is independent from the content of the theory, which means a scientific model could be viewed with a religious attitude, and vice versa. When a model shows no contradiction to itself and any evidence, alternative models are still possible. So, it is impossible to verify a model (Popper 18).⁶ Thus, a theory has two possible states—“falsified” and “not yet falsified”.

⁶ Original Text: “Theories are, therefore, never empirically verifiable.”

A logically falsified theory must be rejected under a scientific attitude. The theory must be either denied or modified until no contradiction is found. However, there are different religious attitudes towards falsified theories. Some religious groups believe in theories even if they are logically falsified, as they put faith at the highest priority. Other religious groups reject falsified theories, as they also emphasize rationality. For example, if God did not give someone the things he prayed for, some may continue believing that “God gives us what we pray for”, while others may modify the theory to “God gives us what we pray for, provided we are faithful” so that contradiction is avoided. While considering science, modern society emphasizes more and more on rationality (何順果 307).⁷ The public generally rejects falsified theories, which is not indicative thus cannot help us distinguish whether their attitude is scientific or religious.

However, for theories that are not yet falsified, public’s attitude is indicative. Under religious attitude, theories are held by faith, so they are considered true when they are not falsified. While under scientific attitude, we acknowledge that these theories could be false, and we do as many tests as possible to increase the probability that our model is true. This principle is strictly held by the academia (Harari 289).⁸ Although relativity is not yet falsified, scientists still tested for gravitational wave. Although the established atomic model is not yet falsified, scientists still developed String Theory. However, the general public’s attitude towards modern science is religious. They consider modern scientific theories true without testing or exploring other possibilities. Here are the causes and mechanisms of this attitude:

7 Original Text: 「因此，在現代工業社會裏，人們的生產方式、生活方式乃至觀念形態，其最大的特點是理性起着越來越大的作用。」

8 Original Text: “Scientists usually assume that no theory is 100 per cent correct.”

i. Low Feasibility of Testing

As explained in I. Content of Theories, to the general public, it is often difficult or even impossible to test modern scientific theories. So, they can only blindly trust the experimental results reported by the academia through media or education, making it a religious attitude. One may argue that these sources are reliable enough, so the attitude is still scientific. In fact, believing in the reliability of such reports has no difference from believing in the miracles mentioned in the Bible, as most of us know nothing more about the story of the LHC than the stories in the Bible.

However, this only explains why the general public does not intend to test scientific theories. It cannot explain in this case, why we are not choosing not to trust science. This would be explained by the following points.

ii. Practical Benefits of Application of Modern Science on Technology

One of the most significant changes brought by the Scientific Revolution is the application of science on technology. (Harari 289)⁹ It was followed by the glorious history of such applications in the Second World War and Industrial Revolution (何順果 261).¹⁰ “Modern technology is clearly more powerful than that of traditional societies” (Sivin 227). Western societies that trusted science and developed modern technology quickly benefited from it and became the leading countries of the world (226)¹¹.

9 Original Text: “In fact, the relationship between science and technology is a very recent phenomenon.”

10 Original Text: 「這次科學革命無論在世界觀和方法論上都取得了突破性進展……人們開始用牛頓力學來解釋自然現象，並利用這些成果從事機械的發明和製造，由此產生了人類社會的機械文明與產業革命。」

11 Original text: “It does suggest that the privileged position of the West comes instead from a head start in the technological exploitation of nature and the political exploitation of societies not technologically equipped.”

It imposed huge pressure on other countries to develop, in fear of being left behind.

A good example from Harari: “Presidents and generals may not understand nuclear physics, but they have a good grasp of what nuclear bombs can do” (289). Presidents, who have not understood or tested nuclear physics theory, should have no reason to believe in nuclear bombs. However, Hiroshima was blown up without the US president understanding nuclear physics. Past examples showed that trusting science by faith can already allow us to achieve its practical benefits, and is clearly much more efficient than testing each theory logically.

iii. Social Conventions

Most of the social activities nowadays unavoidably involve application of modern science. These facts occur to us frequently, which could make them appear to us simple because we are accustomed to them (Poincaré 163). Every time we talk on a phone or use the internet, they work exactly the way the engineers claimed. We know the engineers’ claims are based on technology derived from modern science. So, it is easy for us to instinctively conclude the simple fact that technology works and science is reliable. As a result, it has become a social convention to trust and use technology by faith. And if we do not believe we are listening to a friend on the phone, it is almost impossible for us to keep in line with society and survive.

iv. Education

Most of the education systems nowadays make science a compulsory subject, in which exams are needed. Compared to principles behind science, testing students with content of established theories is much easier. Practically, the latter is also useful in a much wider range of career. To perform well in

these exams, students and teachers focus a lot on the “model answers” based on modern science. Ideas different from the system of western science are simply excluded in education on the grounds that they are backward (Sivin 227). As a result, most educated people regard modern science as the only “correct answer”, without much knowledge about its fundamental induction method and the limitation that it cannot verify theories.

Conclusion

Since Edmond Halley’s successful application of Newtonian physics to predict the return of a comet, human has stepped into the “age of faith in science” (Cohen 62). Despite the fact that modern science could be wrong, most people have trusted and developed it like a religion. It allowed our civilization to develop with an unprecedented speed, but has also brought us disasters like environmental problems, as mentioned in Rachel Carson’s *Silent Spring*.

However, it is true that positive evidence increases the probability that a theory is correct, thus modern science stands a better chance than any other systems of theories. It is also infeasible and inefficient for us to test each scientific theory before utilizing them. More importantly, religions are crucial to society’s stability. Like how Christianity maintained the Roman Empire, the new religion of modern science is also crucial to maintaining the sociopolitical system of modern society. In this sense, the religious attitude has its reason for existing.

Works Cited

Cohen, I. Bernard. *The Birth of New Physics*, 1960. Rpt. in *In Dialogue with Nature: Textbook for General Education Foundation Programme*.

- Edited by Chi-wang Chan, Wai-man Szeto, and Wing-hung Wong, 2nd ed., Office of University General Education, The Chinese University of Hong Kong, 2012, pp. 49–62.
- Harari, Yuval Noah. *Sapiens: A Brief History of Humankind*, Penguin Random House UK, 2015.
- Lindberg, David C. *The Beginnings of Western Science*, 2007. Rpt. in *In Dialogue with Nature: Textbook for General Education Foundation Programme*. Edited by Chi-wang Chan, Wai-man Szeto, and Wing-hung Wong, 2nd ed., Office of University General Education, The Chinese University of Hong Kong, 2012, pp. 11–47.
- Newton, Isaac. *The Principia*, 1999. Rpt. in *In Dialogue with Nature: Textbook for General Education Foundation Programme*. Edited by Chi-wang Chan, Wai-man Szeto, and Wing-hung Wong, 2nd ed., Office of University General Education, The Chinese University of Hong Kong, 2012, pp.63–70.
- Poincaré, Henri. *Science and Method*, 2001. Rpt. in *In Dialogue with Nature: Textbook for General Education Foundation Programme*. Edited by Chi-wang Chan, Wai-man Szeto, and Wing-hung Wong, 2nd ed., Office of University General Education, The Chinese University of Hong Kong, 2012, pp. 161–178.
- Popper, Karl. *The Logic of Scientific Discovery*. Taylor & Francis e-Library, 2005. strangebeautiful.com/other-texts/popper-logic-scientific-discovery.pdf. Accessed 30 Apr. 2016.
- “Science.” *The Free Dictionary*. Accessed 30 Apr. 2016
- Sivin, Nathan. “Why the Scientific Revolution Did Not Take Place in China—or Didn’t It?”, 2005. Rpt. in *In Dialogue with Nature: Textbook for General Education Foundation Programme*. Edited by Chi-wang Chan, Wai-man Szeto, and Wing-hung Wong, 2nd ed.,

Office of University General Education, The Chinese University of Hong Kong, 2012, pp. 219–244.

"Religion." *Merriam-Webster.com*. Accessed 30 Apr. 2016.

何順果，〈人類文明的歷程〉，高等教育出版社，2000。

* * * * *

Teacher's comment:

Yau Ka's paper on the religious function of modern science is a good example for questioning the apparent authority of science. She thinks science based on the principle of falsifiability and verifiability is not far away from religious belief. It is only a matter of difference in degree but not two distinct sets of thought. Both rest on a certain "faith". Her arguments are based on texts and appropriate secondary references. Obviously she has learned much from reading Karl Popper. She has written in a clear language with logical development of her arguments. She deserves this Silver Award for the Best Essay Award because of both her scholarship and the critical questioning of accepted "faith". Good reflection and attempt on a true dialogue with the texts! (Cheung Chan Fai)