

A Dialogue between Newton and Needham

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1. Introduction

Centuries after centuries, numerous scientists begin their quest for truth and their journey to improve people's lives through science. While Isaac Newton marked the birth of a new physics, Joseph Needham brought us insight of science and civilisation in China. However, their passion may ignite an argument if they read each other's work—they understood scientific finding and scientific understanding differently.

2. Quarrel between Newton and Needham

The main disagreement is whether “Chinese science” is science and the discoveries should be given credits. “Newton declined to credit authors who tossed off general statements without being able to prove them mathematically or fit them into a valid framework of dynamics” (Cohen 51). While it is not clear how Newton would view the criteria of science since it is not yet clearly defined at his time, he would probably regards the Chinese thought-system as primitive and its disorganised discoveries not deserving credits. Firstly, the five-element theory and the theory of Yin-Yang leave much room for interpretation, which is not as rigorous as mathematical framework.

For example, the categorisation system is ambiguous (why rat is water and horse is fire). Secondly, the fivefold arrangement cannot group everything. Newton successfully used mathematical framework to connect ideas discovered by other scientists, and explained earth and planetary motions using the same idea—gravity. For the above two reasons, he may not accept the Chinese thought-system as a valid framework, thus, it is not science. However, Needham valued the use of symbols and the laws of cause and effects in ancient China. As things are categorised, it is not primitive thought since anything is no longer the cause of anything else. Though mathematical framework is not used, generalisation, categorisation and attempts to discover hidden relations are found. One has to admit there is some order in the Chinese thought system.

3. My interference

3.1 Common Ground and Main Divergence

I would intervene their discussion by pointing out the fact that a common ground exists and it is not a zero-sum argument. Obviously, both Needham and Newton recognised the importance of framework and a systemic view on nature. Also, it is true that Yin-Yang and the Five-element theory need refinements to catch up modern standard. The main divergence lies in the scope of science. Newton appreciates how the mathematical framework fits or proves observation while Needham values the act of categorising and generation of laws of cause and effect.

3.2 Proposing My Viewpoint

From my point of view, Chinese science does not meet the standard of modern science (the power of discourse in defining science will not be

discussed here), but I do agree with Needham that Chinese science is not primitive thinking. Science, as a body of knowledge, is characterised by its falsifiable explanation and prediction about the universe. The terms and symbols adopted are precise, and the reasoning between statements is strict and neat. It can be seen in Euclid's *Elements*. He defined all the words used and there are no loopholes in his deduction. Without a rigorous system, subjectivity plays a dominating role in Chinese thought-system. From categorising to illustrating the causal relationship among things, the standard is unclear. Besides, it fails to offer strong prediction power. The prediction does not always comply with reality. For instance, rat does not attack horse while it should be true as water conquers fire. We also cannot predict nature using the theory of Yin-Yang. Even though it seems to explain the mechanism or pattern of nature, the explanation is unfalsifiable.

I am not going to question the criteria of science as offering falsifiable explanation and prediction (as it is a convention), that which I believe Newton would be glad to hear. However, I understand and accept Needham's view that Chinese thought-system shows signs of science—generalisation, categorisation and laws of cause and effect. I would compare it with an embryo. It has been controversial about whether an embryo counts as a living thing and I believe it is the same here—we are not sure about the cutting line of science. It is easy to tell whether I, as a pretty mature person, am a living thing or not, just like it is easy to say ideas proved by experiments and mature mathematic framework are science. However, we do not know if the emergence of thought-form counts as part of science; let alone the fact that we are not sure if it can be perfected and refined. Nevertheless, let us begin by discussing these three similarities: generalisation, categorisation and the attempt in discovering relationship. I would like to direct the argument to the

potential of the Chinese thought-system, instead of focusing on how different it is compared with modern science.

3.3 More on Chinese Thought-form

Dating back to Aristotle, the attempt to understand nature and to generalise it came before the appearance of connection of ideas using mathematics, though the causal relationship cannot be verified. Besides, science begins with observation and intuition, which is the same case in China. Mathematician Henri Poincaré (161–178) and economist Steven N.S. Cheung (“Thinking Method (pt. II)”) both pointed out the significance of intuition. The sudden discovery of hidden relations and answers come before mathematical proofs. The Chinese thought-system is a way to organise the observation about nature born from the intuition of hidden relations. If refined, falsifiable explanation and convincing reasoning may appear. I am not trying to prove that it can evolve, yet I argue that there is no valid and convincing evidence to disapprove the Chinese thought-system as a potential framework to explain nature, for it generalises and forms laws. In other words, I cannot tell if it is a seed since I cannot be back to the past, altering the environment and see if it grows when I get the circumstances right, however, I also cannot deny its potential as a seed.

Of course, the intuition mentioned above can be said to be generated by our unconsciousness that mathematical and modern scientific thinking remains the drive. Thus, it can be a mindset complying with the characteristics of modern science that gives rise to valid and useful discoveries. It can be argued that the Chinese attempt is destined to be in vain—it can never evolve into an “objective and universal” framework, given the absence of a mechanical mindset or an environment that cultivates “scientific” mindset. Firstly, the causal relation between the above factors and the appearance of rigorous

framework is to be verified. Secondly, even if we assume the existence of this causal relationship, we still need to assume the objectivity and universality of modern science. In short, is science value-free? If the existing laws are born from the mechanical mind, there can be totally different laws under the cultivation of associative thinking. In other words, the seed may give a different flower but it is still a seed.

Indeed, if we view mathematics as the language that links all ideas together, symbols adopted by the Chinese may also link their ideas and views on nature. If the framework is left to develop, it may give birth to a valid and convincing system understanding the nature, with a refreshing perspective.

In short, the viewpoints of Newton and Needham do not contradict each other. Strictly speaking, Chinese science is not modern science yet it may be a potential framework. The former view leaves little room for argument but for the latter one, there are a lot to discuss.

4. Moving Forward

It will be a waste of time if we keep focusing on to what extent mathematics matters in scientific understanding. They both have great brains: Newton laid the foundation of mathematical view of physics and Needham is known for his research on Chinese science. To make the quarrel constructive, I would shift the focus on how to solve modern problem by merging their knowledge (mathematics and associative thinking), so that the argument is more constructive.

I would play a short video (“Who Controls the World”) showing some modern challenges we face nowadays, such as the failure in predicting economic crisis and the consequences of over-exploiting nature. The existing understanding does not cope with the new challenges well. I think Newton

would agree with me that we need to construct new reasoning and connection among ideas when new phenomenon is observed, since he said that he did not prove the existence of a universal gravitational force but the model fits with existing observation. Elements of Chinese thinking are believed to be precious nowadays. Understanding universe as a vast organism that all parts cooperate provide us insights. From the study of brain and nervous system in biology to the design of transport system, from formation of economic models to the understanding of nature, the concept of interdependency plays a dominating part. I would ask Needham more on the characteristics of Chinese thinking and suggest Newton to think of ways to systematise the ideas into a valid and falsifiable framework, probably using mathematics as the linkage. Assumed to be value-free, mathematics can continue to be the “language” as it was a well-developed system of symbols. It has also been widely adopted and a universal language helps the transfer of knowledge and communication among scientists.

5. Conclusion

In history there are no assumptions, we cannot prove or disprove the possibility of transformation of Chinese thought-form. Nevertheless, we can encourage scientists to recognise the valuable elements in Chinese thinking and pay effort to integrate both thinking systems, so that we can improve people’s lives. Scientific knowledge, in the eyes of most of us, is the Bible of the modern world, but we should realise that scientific knowledge is also a kind of discourse and it may not be the only way to understand and explore the world. The acceptance of multiple definitions of knowledge, such as “know-how” (Lyotard 21), can be a way to achieve a better world.

Regarding science as the quest for truth, I would like to quote words from Stephen Hawking (“Does God Play Dice?”)—

To see where a particle is, one has to shine light on it. But by Planck's work, one can't use an arbitrarily small amount of light. One has to use at least one quantum. This will disturb the particle, and change its speed in a way that can't be predicted.

Despite the controversy of subjectivity of science, truth still seems to be far away from human and one can never be assertive in saying that modern science is the only approach. In spite of all these inconvenient facts, the journey continues and new discoveries are as exciting as always. Any argument is contributive in moving science forward. Truth, the bright world outside the Plato's cave, though keeps slipping through our hands, is believed to exist.

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Teacher’s comment:

This essay discusses the differences between Newton’s and Needham’s understanding of science. It has a clear structure and has rigorous and convincing arguments. The author uses an analogy to explain that Chinese science is like an embryo. It is not comparable to modern science, which is like a grown-up adult. The essay then leads to the discussion on whether science is truly universal and value free; is science also subjective? The author even relates this point to modern challenges such as financial crisis and environmental problems. This essay demonstrates that the author has deeply reflected on the authority of modern science and an understanding of the importance of the quest of finding out the truth. (Kiang Kai Ming)