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On the virtue of practicality for scientists

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Abstract

This paper argues for the importance of the virtue of practicality for scientists, highlighting its role in scientific research and governance of scientific integrity. The pursuit of truth is considered a key value in scientific endeavors and must take precedence over personal interests. Rigorous scholarship is emphasized as essential for scientific integrity, as it serves as the moral cornerstone for carrying out research and is necessary for building trust in research evidence and professional knowledge. The paper concludes that the practicality of scientists is crucial for obtaining empirical facts and data, proposing explanatory laws, and ensuring the truth of theories, making it increasingly important in the future governance of scientific integrity.

Keywords: Virtue of practicality; Scientific research; Governance; Scientific integrity; Pursuit of truth; Rigorous scholarship

1. Introduction

The practicality of scientists often manifests itself in scientific research activities by obtaining empirical facts and data through observation and experimentation based on the actual conditions of nature, and then proposing explanatory laws on this basis. They hold the concept that "practice is the ultimate criterion for testing truth," meaning that the correctness of a theory cannot be judged by the academic prestige or social status of the person who proposes the theory, but rather by empirical facts, whether it is consistent with them, and whether it can withstand the test of empirical facts, and so on. As an intellectual activity, the goal of science is to obtain a true rational understanding of nature. It is precisely this spirit of practical validation that ensures the truth of theories and gives science real power.

Scientific integrity is directly related to the virtue of practicality for scientists, and the governance of scientific integrity has become a global challenge. The key issue lies in the fact that governments and regulatory agencies should strive to help the scientific community create an environment that promotes responsible research behavior, enhances the practical awareness and autonomy of academic institutions and researchers to correct their mistakes, rather than relying solely on regulatory management models, or even playing the role of "police" in the scientific community. Departments such as the National Academy of Sciences in the United States have realized that an uncontrolled regulatory management model can easily reinforce the administrative character of science, increase costs without necessarily being effective, and reduce the flexibility of academic institutions and researchers in facing research opportunities. It is evident that the virtue of practicality for scientists will play an increasingly important role in the future governance of scientific integrity.

2. Pursuing Truth

Francis Bacon has a vivid expression regarding the pursuit of truth: "Truth (which is judged only by itself) teaches us that seeking truth (which is to court it like a lover), understanding truth (which is to acquire it), and believing in truth

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(which is to enjoy it) are the highest virtues of human nature... If a person's heart can be motivated by love, guided by destiny, and revolves around truth as its axis, then that person's life will be like heaven on earth." Einstein, inspired by Bacon, believes that the desire to pursue truth must take precedence over all other desires and is one of the noblest qualities that humans can be proud of. If a person does not recognize that pursuing objective truth and knowledge is the highest and eternal goal of human beings, they will not be respected. Only by pursuing truth for the sake of truth and taking action, can the spirit be liberated and become sublime.

Although the discussions about values impacting truth in modern science are intense, the pursuit of truth must be considered another value that is inherent in scientific endeavors. The attitude of relentlessly seeking (unfound) truth with the objective light as a (unattained) ideal is still cultivating the lives of scientists. Even if the power of technology can make many modern conflicts more destructive, the inherent value of science still serves to eliminate the causes of these conflicts. Even if the concept of scientific truth is under attack today, it still serves our civilization exceptionally well.

In 1935, Chu Kochen presided over the 20th annual meeting of the Chinese Science Society in Nanjing and gave a speech entitled "Interests and Right and Wrong". He proposed that the scientific development of China must first ask whether China has the "air" to cultivate science. "What is the 'air' for cultivating science? It is the 'scientific spirit'. What is the 'scientific spirit'? The scientific spirit is 'only asking about right and wrong, without considering interests'. This means that only by seeking truth and disregarding personal interests can there be the existence of science." As a meteorologist, he found that the meteorological records of various provinces were often inaccurate. The person in charge of meteorological investigation and recording "often prioritized personal convenience and disregarded the facts. If this habit does not change, China's science will be hopeless." After becoming the president of Zhejiang University in 1936, Chu Kochen used "seeking truth" as the school motto, meaning "a gentleman's learning is not concerned with similarities and differences, only with seeking the truth." This is in line with the Harvard University motto of "being with truth." In a speech at the school, he summed up the spirit of scientists in two words: seeking truth. He believes that the spirit of seeking truth is to pursue truth and be loyal to truth. At the end of the speech, he exclaimed: "Hooray for the spirit of seeking truth! This is not something that only those with great courage and tenacity can do. I hope that everyone can follow suit! Do not fear difficulties and study diligently!"

In 1941, Chu Kochen wrote an article entitled "The Spirit and Method of Science" for the Zhejiang University "Thought and Times" magazine, further elaborating on the spirit of "seeking truth": "What is the goal of modern science? It is to explore truth. Scientific methods can be changed at any time and anywhere, but this scientific goal, which is the ultimate goal of science, is eternal and unchanging. The scientific spirit of seeking truth and being loyal to truth is the foundation of modern science."

3. Rigorous scholarship

Integrity is the moral cornerstone for scientists to carry out their careers, an intrinsic element of research activities and their excellence, and the foundation for researchers to trust each other and believe in research records. It is also the basis for society to trust research evidence and professional knowledge. Without integrity, there is no science, and it is impossible to achieve the purpose of science. People can forgive honest mistakes, but they cannot tolerate lies and intentional deception. Schrödinger pointed out profoundly that in the sincere pursuit of knowledge, scientists often must endure ignorance for a long time. True scientists would rather tolerate ignorance than fill the gaps in knowledge with speculation. This is not due to a lot of scruples about lying on the conscience but based on the following considerations: no matter how annoying such a gap is, if it is eliminated by fictional content, it will weaken the strong desire to seek reliable answers. The shift of attention can have a significant impact, and even if the answer happens to be in front of us, it may still be missed. To steadfastly face an unknown thing and regard it as a promoting factor and signpost for further exploration is natural and essential in the mind of a scientist. This can be said to be a perfect interpretation of the honesty and rigorous scholarship of scientists.

Pavlov said that we should never try to cover up our knowledge defects, even if we use the boldest guesses and hypotheses as an excuse to cover them up. Regardless of how dazzling the beautiful colors of this soap bubble may make you, the soap bubble will eventually burst, and at that time, you will get nothing but shame. It emphasizes that scientists should not deliberately conceal the problems in their research and expose the problems to everyone for discussion.

Academician Jiang Xikui wrote in his diary: "We cannot say, 'This law is correct because Einstein said it.' We can only say, 'This law that Einstein said is correct because it has been proven by the experiments of certain scientists, such as X and Y.'" He proposed to adhere to the "three strict" principles in scientific research methods: a serious working attitude,

a rigorous thinking method, and a strict working method, emphasizing that top-notch scientists should not only have the determination to adhere to the truth but also have the courage to self-denial.

Academician Zhong Nanshan, in the case of unknown causes of SARS, relied on facts, did not agree with the view that chlamydia was the cause, and ultimately proved that SARS was caused by a new coronavirus. He controlled the disease with corticosteroids and saved the lives of many patients. He said: "Science can only seek truth from facts and cannot take refuge in formalism. Otherwise, patients will be the ones who suffer." Academician Zou Chenglu insisted that "objective facts are the only basis for scientific research." Every experimental data must be repeatedly verified, every argument must have sufficient evidence, and every paper must be carefully considered. He said: "The achievements of scientists and their reputation have certain objective standards recognized by the international scientific and technological community. They cannot rely on newspaper propaganda, leadership approval, or self-proclamation. They can only rely on solid research work and make creative achievements recognized by the international scientific and technological community."

4. Dare to struggle

Scientists need to be particularly vigilant about pathological science, also known as wishful science, which is "scientific" research caused by the self-deception of researchers due to their subjectivity errors. In the history of science, there have been many cases of pathological science, such as the observation of canals on Mars in astronomy, N-rays in physics, and the recently questioned "cold fusion." In these cases, the researchers were completely honest, but they did not realize the complexity and possibility of errors in scientific observation, causal reasoning, and theoretical construction. They did not see that a person can easily be led astray by subjective factors, wishful thinking, hasty reasoning, background interference in observations, and the accumulation of rare accidental events, leading to the "observer effect" - the desire to observe a certain result makes people "observe" things that do not actually exist, and eventually fall into the quagmire of error.

On November 20, 1977, a certain newspaper published an abstract of an article by a Japanese scholar, and "earthquake clouds" were first introduced into China. From January to April of the following year, some domestic newspapers reported continuously about the Japanese scholars' accurate prediction of earthquakes using "earthquake clouds." Afterwards, a certain major newspaper reported four times on the achievements of earthquake prediction using "earthquake clouds," and a certain TV station reported that Japanese scholar Tadasaburo Kenda, who had served as mayor of Nara City, had a success rate of 80% in predicting earthquakes using "earthquake clouds," while a Chinese observer had a success rate of 86%. However, scientists such as Hong Chaosong and Li Yinyuan firmly opposed the use of "earthquake clouds" as research results. Hong Chaosong said, "There are earthquakes of all sizes erupting every day in the world. Someone who looks at the clouds and says there will be an earthquake in the east or the west will occasionally be correct, but it's actually just guessing. How can this be called a research result? No one in our department believes him, but the media is promoting it so vigorously. Isn't this a joke?"

Scientists especially need to vigorously fight against pseudoscience, purify the scientific research environment, and defend the sanctity and dignity of science. Pseudoscience violates scientific methods and common procedures, and promotes non-scientific theories as science for fame and fortune. Pseudoscience can be roughly divided into cultural pseudoscience, superstition pseudoscience, pseudoscience in unknown areas, and fraudulent pseudoscience. Cultural pseudoscience involves bizarre explanations of natural mysteries (Bermuda Triangle, Loch Ness Monster, Bigfoot, etc.) and mysteries of civilization (pyramids, Atlantis, Stonehenge, Easter Island, etc.), mysteries of extraterrestrial civilization (ancient astronauts, unidentified flying objects, people as space test subjects, etc.), and theories of the origin of earth disasters (planet collision theory, Noah's Ark theory), and the law of life cycles. Superstition pseudoscience includes various spiritual studies, astrology, and fortune-telling. Pseudoscience in unknown areas includes studies of special functions ("human science"), parapsychology, and research on supernatural forces. Fraudulent pseudoscience includes fraudulent doctors, water turning into oil, changes in molecular structure by aerodynamics, exaggeration of efficacy and concealment of side effects, and brainwashing-style advertising.

As Academician Zou Chenglu said, "In order to promote the healthy development of science in our country, we must not only innovate, but also crack down on academic fraud, which is especially important. Only on the clean land cleared by scientists can the stage for original and innovative work be fully realized; otherwise, if true and false cannot be distinguished and good and bad are not distinguished, where can our young scholars go?" He has twice joined other academicians to propose discussions on "spiritual civilization in scientific research". In the face of major academic issues, he has a clear attitude and strong principles. He never compromises or backs down on errors. In response to behaviors such as scientists advertising nucleic acid health products, exaggerating academic achievements by overseas students returning to China, and companies boasting about "cloning all human organs within five years," he called for

the upholding of scientific ethics and the fight against scientific fraud. Therefore, he is known as the moral benchmark and "guardian of scientific conscience" in the Chinese scientific community.

Another phenomenon that undermines the dignity of science in research is wanton exaggeration. "The spring of science is mixed with fish and dragons, with mud and sand. Both the good and the boastful and deceptive are supported, and sometimes the support is even greater." In 2000, Academician Hong Chaosheng expressed his concern in the article "Effective Promotion of Professional Ethics in the Scientific and Technological Community." He worried that the exaggeration of the practical significance of scientific research topics, the achievements of research and development work, the true level of the scientific and technological team, and the leapfrog growth of young people in science and technology, as well as the culture of exaggeration, would lead to improper allocation of resources and affect the effective progress of key scientific research and development. Especially if the integrity of scientific research personnel is eroded, it will affect the growth of young scientific and technological teams, and the consequences will be severe. This has caused unfair and unjust distribution of scientific research resources and has dampened the enthusiasm of many honest scientists. A good innovation ecosystem requires collective efforts from scientists to repair and maintain it.

5. Conclusion

Although the spirit of scientific truth-seeking and pragmatic or virtue of practicality is becoming more and more important, however, due to some unreasonable phenomena are still existing in the current society, people's ideological concepts are affected and their beliefs are constantly shaken, especially the Westernized ideas of the young generation are more gradually permeated, and their scientific beliefs are constantly impacted. Therefore, on the road of pursuing truth in the future, the realistic spirit of scientists who are rigorous in research and brave in struggle still needs to be continuously strengthened and internalized.

Compliance with ethical standards

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