Theory of Knowledge Essay

Prescribed titles #5

"Areas of knowledge are most useful in combination with each other."

Discuss this claim with reference to two areas of knowledge.

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The definition of combination with each other is that the research methods or conclusions in different areas of knowledge are mutually used. That means the research method of one AOK is adopted by another AOK, or the conclusions of another AOK are utilized when researching and solving a problem in one AOK. The definition of useful is to promote the development of the areas of knowledge themselves, or generate new disciplines, new knowledge, and new views or solve practical problems and benefit mankind. Although sometimes the combination of areas of knowledge may bring some puzzles and problems, I agree with the view that the combinations of areas of knowledge are most useful. This essay will focus on the discussions about this claim with reference to the natural sciences and the human sciences respectively.

When scientists began to quantitatively describe the state and relationship of objects in the research of natural sciences, they had already combined natural sciences and mathematics. For example, when people used to describe the speed of a physical motion, they could only describe it as fast or slow, but after using mathematical quantification, they can accurately describe the speeds with specific numbers such as 100 meters per second or 10 meters per second. This method of quantification makes the natural sciences and mathematics to be closely integrated and makes the vague perceptions that are obtained through original estimation and imagination in the natural sciences becoming more precise and concrete. Furthermore, the mathematical principles, formulas, and methods can be used to process the observed and quantified data, so as to discover the deep relationships and laws of the natural world. For example, the German astronomer Johannes Kepler obtained data on the elliptical orbits and revolution periods of planets through astronomical observations, and he used mathematical logarithmic formulas to calculate these data, thereby discovered the precise proportional

relationship between the square of the planets' revolution periods and the cube of the semi-major axis of the orbits, which is the famous Kepler third law (Henderson). It gave people a clear understanding of planetary motions. Of course, the development of mathematics also draws on the results of natural scientific research. For example, the physicists Yang Zhenning and Rodney James Baxter came up with the same matrix equation "Yang-Baxter equation" when they were studying different physical problems respectively (Jimbo 3759). This equation was adopted by many mathematicians for mathematical research and produced several branches of mathematics, which have significantly promoted the development of mathematics. Therefore, the combination of the natural sciences and mathematics promotes the development of their own areas of knowledge respectively.

In addition to mathematics, the natural sciences have also been combined with other areas of knowledge to produce corresponding new disciplines. For example, bioethics is a new discipline produced by the combination of biological science and ethics. In recent years, emerging technologies in biological science have emerged one after another. They may bring huge benefits to mankind, but at the same time, they have also raised many unexpected ethical issues. Bioethics is to closely integrate the latest developments of technologies in biological science, clarify and solve related moral issues, and ensure the correct direction of biological science development. In 2019, Chinese scientist He Jiankui was sentenced to 3 years in prison for conducting "illegal medical practices". He forged ethics review documents and recruited couples in which the father was infected with HIV and the mother was not. And he used human embryo gene-editing technology that has not been strictly verified for safety and effectiveness to assist the couples to have babies by sparing the babies the possibility of becoming infected with

HIV later in life. Two women became pregnant and three gene-edited babies were given birth (Normile). This kind of artificial modification of human genes is extremely inhumane and anti-ethical. This example further illustrates the important role of bioethics which is produced by the combination of biological science and ethics in guiding the direction of scientific research and benefiting mankind.

Some people believe that these emerging disciplines such as bioethics have restricted the research of scientists by setting up moral barriers, and to a certain extent hindered the development of natural sciences. But I believe that the ultimate purpose of studying natural science is to seek the well-being of mankind. If there are some people who can not enjoy the welfare from the achievements of natural sciences but instead become victims of scientific research, then those sciences are meaningless even if they reach a high level.

However, the combination of natural sciences and other areas of knowledge does not necessarily lead to useful results. For example, Newton always wanted to combine natural science with religion and use natural science methods to prove the existence of God, but he failed. The natural sciences are for studying the running principles of the material natural world, while religions have a bigger scope but usually concerned with the spiritual meanings. Forcibly combining religions with natural sciences, trying to use the principles, methods, or conclusions of natural sciences to prove religious theories, or use religious theories to explain and solve natural science problems, will not necessarily bring useful results.

The combination of human sciences and other areas of knowledge not only promotes the development of human sciences but also solves actual problems of society. Economics is a subject in the human sciences. Its concepts, theories, viewpoints, and the complex relationship and dynamic evolution of economic variables are sometimes difficult to describe clearly in words, but if we use mathematical equations or geometric figures to illustrate them, then they are not only simple and clear but also more accurate. For example, the definition of price elasticity to demand in microeconomics is completely described by mathematical formulas, which are simple and straightforward, very easy to understand, which fully demonstrate the charm of economics using mathematical language. Economists use mathematical thinking paradigms, argument forms, and expressions to describe economic problems, which not only makes economic knowledge more precise and rigorous but also expands the scope of economic research and opens up some new theoretical branches, such as Game theory. The game theory has been widely used in real-life auction rule setting, national debt investment, arms race, environmental protection, etc. For example, Paul Milgrom and Robert Wilson, winners of the 2020 Nobel Prize in Economics, designed new auction formats for special goods and services such as radio frequencies based on game theory. Their discoveries have benefitted sellers, buyers, and taxpayers around the world. (The Sveriges Riksbank Prize In Economic Sciences In Memory Of Alfred Nobel 2020) This is also an example of the combination of economics and mathematics to solve practical problems.

Psychology is a subject of human sciences, which borrows the research methods of natural sciences such as observations, hypotheses, experiments, and summaries to collect data and conduct research. Before modern psychology, most of the problems of psychology belonged

to the category of philosophy, using the methods of observation, introspection, reflection, argumentation, without experimentation and statistics. For example, psychologist Sigmund Freud had rich clinical experience. He had access to many patients and could obtain sufficient case data, but these cases are not equivalent to experiments. His theory could be verified but could not be falsified, so his psychological theory is not scientific. Since psychologists started using the experimental methods of natural sciences to conduct psychological research, psychology has departed from the scope of philosophy and has become an independent science with many important achievements. For example, the Hawthorne effect was identified by the experiments at the Hawthorne Electric Company in the 1920s in the US (Cherry). On this basis, double-blind experiments are developed by scientists, which are widely used in various experiments such as medicine, food, and forensics now.

However, some scholars believe that psychology is a social science, and human psychological activities will be affected by cultural, social, and other factors. Ignoring these influences and relying on experiments under laboratory conditions to draw conclusions, the reliability is questionable. But I think psychology has achieved great results by borrowing the experimental method from natural science. We still need to insist on using the method to develop psychology and continuously optimizing the experimental environment as much as possible to make it closer to the real society in order to obtain more reliable results.

The combination of the human sciences and other areas of knowledge may also bring puzzles and problems to mankind. For example, the British philosopher Herbert Spencer applied

the natural selection theory in Darwin's theory of evolution to sociology and proposed the theory of "survival of the fittest" which is the foundation of Social Darwinism. Many Social Darwinists opposed governance to help the poor and even claimed some races are superior to others (Social Darwinism In The Gilded Age). This kind of thinking may cause society to reduce humanistic care for vulnerable groups such as the elderly and the disabled people, and may even exacerbate racial discrimination and cause serious problems, such as social class antagonism. Therefore, the thoughts generated through the combination could bring puzzles and problems to our society.

Along with the development of society, human beings will encounter problems such as population, food, energy, ecology, environment, etc. It is impossible to effectively solve any of these problems by relying on any single area of knowledge. The combination of different areas of knowledge can only be most likely useful. From the above examples of the natural sciences and the human sciences, it can be confirmed that the combination of different areas of knowledge not only promotes the development of the areas of knowledge themselves, generates new disciplines, new knowledge, and new views, but also solves practical problems and benefits mankind.

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