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# **Humanity as the Limits of Modern Science**

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## **1. Introduction**

In this 21st century information age, boundaries of science are expanding with increasing cross-disciplinary research. With the technological advances such as space technology, artificial intelligence, genetic engineering, most people would agree that modern science is powerful in explaining nature and facilitating human lives. While applied science is interwoven deeply with our everyday lives, it is a must to look into the limits of modern science. To put it in an extreme way, imagine someday scientists have answered all the big questions, would modern science eventually perfect human lives? If not, what is science incapable of even when it has done its best? This essay will discuss the limitations of modern science from the perspective of humanity.

## **2. Comparing Human Nature and the Nature of Modern Science**

It has been controversial that whether social science, which applies scientific methods in understanding society, is real science or not. The

infeasibility of controlled experiments and the exceptional cases in social theories make its predictability and reliability, required in natural science, doubtful (Gutting). Although social science is not our focus, the debate points to the fundamental differences between human nature and the nature of modern science.

One of the key distinctions is human subjectivity and scientific objectivity. As Kandel describes, “[e]ach of us experiences a world of private and unique sensations that is much more real to us than the experiences of others” (185). Owing to subjectivity, we possess our own emotions, desires, habits and faiths. Practically, it is the reason we pursue different careers and lifestyles, which contributes to the diversity of society. However, since modern science aims at establishing an objective worldview, it does not deal with individuality. Using Kandel’s example, whereas people have non-identical perception of the color blue, scientists would only be interested in its objective facts such as its physical and chemical origin and human neural basis of it (185). Individual perception of blue that does not lead to universal principles are out of the scope of science.

Besides, human thinking as a complex whole is contrary to reductionism in modern scientific investigation. Human thoughts and behaviours are influenced by numerous factors such as personalities, personal relationships, self-experiences, cultures and traditions. The same sentence spoken by different people or in different contexts would contain different meanings. Similarly, one’s single thought is inseparable from oneself and its social context. In contrast, modern science asserts reductionism which analyses “a complex phenomenon in terms of its simple or fundamental constituents” (“Reductionism”). Scientists reduce matters into atomic component to study their properties and interaction. If applying reductionist approach

to subjectivity, instead of considering the whole, it will inevitably reduce human thoughts into a simplified but inaccurate models.

Human values given rise by subjectivity are considered as the core of human beings. Since human beings would distinguish good from bad, they develop moral values, though not universal, like peace, honesty and fairness. All kinds of social order including political, legal, economic, educational system, etc., are established and changed over time due to their value judgements. On the contrary, in depicting the nature of science, Sivin mentions science is value-free in the narrow and abstract realm (228). None of the scientific laws would be affected by human thoughts. But Sivin also points out human values determine how these laws and hypotheses are utilized (228). This exactly shows that, on one hand, science is not able to answer moral questions as it is value-free. On the other hand, moral issues must be answered as they affect scientific development, although not science itself. Therefore, in order to tackle ethics, human beings need more than science.

### **3. Application of Science in Human Society**

From the contrast between human nature and the nature of modern science above, we can conclude that science reaches its limit when encountering human subjectivity. While this seems not hard to recognize, in reality, science is often used beyond this limit. Appropriate application of scientific knowledge in handling social issues can be useful. For example, biological research on drug addiction provides a convincing reference for setting up penalty laws and promoting public education. When and how science should be applied is debatable. Nonetheless, we should be

aware that using the tools of science to address non-scientific problems is sometimes improper and risky.

Statistics, “the practice or science of collecting and analyzing numerical data in large quantities”, is applied in non-scientific fields (“Statistics”). In Hong Kong, the government has set up Census and Statistics Department to collect data on various subjects. It is perceived as a method to make citizen-centric and effective policy. However, the accuracy of data is disputable. As mentioned, every human thought involves numerous factors ranging from individuality to society while statistics is not able to take all of them into account. By the simplified and inaccurate data, there is no way for decision makers to interpret the complex reality accurately. In addition, since only limited factors can be examined, it is already assumed which factors are crucial and which should be neglected prior to the data collection. Nonetheless, unlike scientific assumptions that can be falsified by experiments, subjective assumptions in statistics cannot be proved wrong concretely in spite of its great influence on reliability. The researchers can even manipulate the results through their choices of assumptions.

Besides, policy making through quantitative methods is likely to fall into generalisation. As previously said, every human being has a unique mind. A hundred people would have a hundred, if not more, non-identical thoughts on a provided question. Statistics categorises their opinions into several groups such as five levels of agreement. It generalises relatively similar opinions and dismisses the small differences in between. More importantly, generalising the results from a sample to a population leads to the problem of induction which can only prove a statement strong or weak but not right or wrong. Even though statistics is an important scientific tool, it is only used to support findings rather than infer a new claim. Yet, not

realising its limitations, some decision makers heavily rely on statistics to make inferences that easily go wrong which might bring negative impact.

On top of scientific methods, borrowing the notion of universalness in science to human society is another problem. Science is universal. Every matter in nature is perfectly regulated by principles and mechanisms. As mentioned, modern science aims at establishing an objective world while human beings are subjective. It is understandable that, if a government applies such a notion to social issues, individuality must be dismissed. For instance, Hong Kong education judges all students by standardised exams in spite of student diversity. Most schools expect all students to pursue the same objective goal and provide less supports to non-academic development. The government policies applied universally to its target audience easily comes into unnecessary conflict with human subjectivity.

Raising another example, although Darwin carefully avoids mentioning human evolution in *Origin of Species*, eugenics is proposed according to his theory of natural selection (Watson 110). Eugenics is defined as “improving a population by controlled breeding to increase the occurrence of desirable heritable characteristics” (“Eugenics”). It implies, if it is practiced, a universal standard of desirable and undesirable human characteristics must be reinforced. In the sterilization and mass murder of Nazi Eugenics, the government considered characteristics like physical disability, homosexuality and some races like Jews undesirable. Yet, many disagree with the standard and even the appropriation of Eugenics. The way it asserts inferiority of certain kinds of people amounts to discrimination against human diversity. From history, we can see the bias caused by strict regulation of society under subjective principles and mechanisms. The notion of science in society can harm diversity in humanity.

## 4. Conclusion

Whereas natural scientists perceive science as their goals, it is seen as a tool to improve human lives by many others. To avoid overuse and dangerous consequences, it is necessary to figure out the limits of science which include not only humanity. Due to the fundamental differences between human nature and nature of science, modern science is not able to answer human questions raised by subjectivity. Based on this affirmation, social policies made according to scientific methods and notion are likely to neglect and even damage human subjectivity and diversity. Although the limits of modern science are not clearly defined yet, decision makers must be alert and careful when they use science to solve problems involving humanity.

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### **Teacher's comment:**

Sciences and humanities are two important cultures in human history. Through the speculation of their relationships in the context of social science, Miss Tsang reflected on the essential characteristics of human nature and the nature of modern science, such as subjectivity and objectivity, individuality and universality. She argued that modern science is unable to answer ethical questions because of its nature and characteristics. Scientific advancement may bring some of us good living conditions; it definitely has caused lots of ethical issues for societies and problems in the world in the 21st Century. With a clear flow of argumentation and analysis from multiple dimensions, Miss Tsang's paper is a good read to foster critical reflection on modern science, a seemingly all-powerful product of human minds. We shall all keep an eye on its limit and be aware of its application. (LI Ming)

