## On the Boundary of Science

### I Introduction

In *The Birth of a New Physics*, Cohen mentioned the arrival of "the age of faith in science" after a Newtonian prediction on Halley's Comet came true (62). Since then, the force of (natural) science, which may be characterized by mathematization and experimentation (Needham 1 fn. 2), has influenced other fields such as politics, psychology and social science (Cohen 62). On the other hand, the use of Keynesian economics[1] to counter Great Depression (*Principles of Macroeconomics* ch. 17.1) shows that the value of social researches does not only exist in academia. Instead, they can be applied to build a better society, which is an example of (social) science being applicable to the pursuit of goodness. Nevertheless, is this example one of the "regular facts", or just a rare exception (Poincaré 164)? In other words, to what extent can science be applied to the pursuit of goodness? To answer this question effectively, I would like to explore the issue on both micro-level and macro-level.

### II Life and Society

On micro-level, an individual's pursuit of goodness is to live a good life commonly. For instance, one may consider their good life as doing one good deed a day, while the famous philosopher Socrates thought that it is to know thyself[2].

In the case of knowing ourselves, science can be applied to a large extent. In Darwin's *On the Origin of Species*, he used the scientific method to investigate the divergence of character between species from the experiment of breeding animals (85). Later, Mendel approached similar problem quantitatively and realized some factors[3], which come in pairs, were passed from parent to offspring (Watson 104). Finally, Watson reduced the problem from species to DNA and discovered the double helix (141), renewing people's understanding of themselves. By learning such scientific knowledge, we are able to understand more about ourselves and pursue goodness. We may also utilize scientific method as a framework to discover psychological self.

In the other cases, science can still be applied implicitly. It is true that science may not help in living a good life explicitly. One interesting example is the aforementioned doing good deeds every day. We would neither consider helping people as doing experiment nor estimate the arithmetic mean when we donate money. Nevertheless, scientific knowledge and

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[1] It is questionable whether the policymakers have read *The General Theory* and understand Keynes' theory. Nevertheless, the World War II later has caused the US to adopt expansionary fiscal policy.
[2] In the *Apology*, Socrates said, "The unexamined life is not worth living." (Plato para. 35b)
[3] Later named as "genes"

ideas often serve as the foundations for problem solving, which is essential in living a good life. In *Principia,* Newton separated the horizontal force and vertical force in motion (Cohen 56), which is an application of reductionism in problem solving. Similarly, living a good life is the ultimate task, which we may have sub-tasks, sub-sub-tasks etc. Lastly, we may tackle each basic task with our knowledge efficiently.

In contrast, the pursuit of goodness on macro-level can be defined as building a better society. Some people may think that it is equivalent to the summation of every members' good life or society is summing up its member. Yet the paradox of thrift[4] shows that these ideas are fallacious. We shall discuss them further in the latter section. Then, apart from countering depression, can science help build a good society?

Historically, it seems the answer is positive. In *The Beginnings of Western Science*, Lindberg pointed out that Socrates represents a movement away from cosmological concerns towards ethical and political matters (11). Later, Darwin abandoned the idea of creationism[5] and developed the theory of evolution (ch. 14 par. 38). Although these two events may not have significant relationships with a good society, they have probably stimulated[6] some important values such as freedom of speech and may have eliminated some superstition in the society.

Perhaps a more direct example is the faith in science in Carson's *Silent Spring*. She could challenge the authority and let people know the adverse effect of chemical sprays (Carson 146). With the support of researches and alternative methods (Carson 152-153), she successfully arose the general public's environmental concern. Without science, even though she might still know that herbicides are bad for health, her argument would be less sound to the readers. Without trust in science, the public may not listen to her or even buy this environmental science book.

## III Boundary

Based on the previous micro- and macro-level analysis, the application of science to the pursuit of goodness seems to be general instead of rare. Nevertheless, boundaries actually exist in both levels currently.

While reductionism may be used to reduce the complexity of a good life, we may have to reduce something subjective to something objective at the end (Kandel 187). This is

[4] The idea that when every people try to save more money (which is good for them) in the economy, the economy will worsen due to drop in aggregate demand
[5] The original term is "unity of design" in Darwin's book
[6] Converse is also possible, but most likely it is a two-way relationship given Socrates and Darwin's significance

because the meaning of good life varies for different people and is often subjective. For instance, know thyself can be divided into biological knowledge and psychological knowledge. Reducing further may lead to knowledge regarding subjective consciousness, which Kandel stated probably "a complete transformation of scientific thought" is needed (187). Of course, many other meanings of good life do not require investigation of consciousness, but it is undeniable that a subjective task is difficult to break down and tackle with the use of science.

On the macro-level, the boundaries are even tighter. Following the previous paradox of thrift, it is actually caused by the complexity of human being. In natural science, scientists investigate simple units such as atom, cell or intimately mingled element such as water (Poincaré 163). These units or elements are usually homogeneous. Meanwhile, the simplest unit in a society is human already. Nonetheless, human beings are heterogenous, which is why Poincaré mentioned social science as science that has the least results (164). This also implies that application of science to the pursuit of a good society would generate results with a low chance of recurring (162).

Furthermore, using science to pursue a good society would face a severe problem with experimentation. Suppose some local government officials have a hypothesis that using chemical sprays is not detrimental. To do an experiment, they allow the use of sprays in certain areas. Unfortunately, Carson launches her book *Silent Spring* and proves that they are wrong (146). As a result, they get pulled down by voters in the next election.

While some people may argue that the spray could be used in animal test first, it is clear that conducting an experiment of similar scale is almost impossible. Firstly, experiment(s) in society is not independent. The officials got voted down due to bad performance. Meanwhile, science requires many regular facts gathered from experiment (Poincaré 164). As a result, most experiments are being repeated to avoid measurement error. Secondly, experiment on society sounds immoral as people have the right to know in a good society. Thirdly, the fact that the result of an experiment is unknown deter people from conducting a social experiment. If the experiment brought adverse results, they would be held liable for it.

Last but not least, science can often solve part of the problem in society only. A good example is the use of biological control on plants (Carson 157). Indeed, it can prevent the harmful effect brought by spraying (Carson 158). Nevertheless, the population of imported species may grow out of control, which creates other problems. Even if science brings a perfect solution, it cannot solve the problem of distribution of the benefits or costs. As

(scientific) method is a selection of facts (Poincaré 164), judgmental factors have taken place. It is more difficult to achieve equality, while equality is commonly considered as a characteristic of good society.

## IV Conclusion

By referring to the ideas in different classics, we have analyzed the potential use of science to the pursuit of goodness. On micro-level, science can be used as a framework as well as foundation to solve problem, which leads to good life eventually. On macro-level, the faith in science may stimulate many important values and eliminate some conflicts in society. Nevertheless, on the journey to goodness, we should keep in mind that science also have its own boundaries currently. Otherwise, if everyone just blindly use science to pursue their own goodness, many problems would occur and we may see a paradox of goodness.

(1340 words)

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