Is Sociology a Science?

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I. Introduction

Physicist Richard Feynman once said, "the philosophy of science is as useful to scientists as ornithology is to birds". While this may be true for cases where predecessors have already "saved their successors the trouble of thinking" (Poincaré 162), it is not the case for sociology. Although the discipline is defined as "the scientific study of social behaviour and human groups" (Schaefer 5)[1], many sociologists frequently feel "insecure" about the status of sociology as a scientific discipline (Ritzer 446), some even go so far as to deny it (Islam 5). Therefore, this essay attempts to discuss the important question of whether sociology is a science. Since it is impossible to consider this question without thinking about what is science, this essay consists of two parts: the first part would try to discuss the essential criteria of science, while the second part would examine whether sociology is a scientific discipline.

II. What is Science?

The term "science" is normally, though not exclusively, perceived to

1 Although there are various definitions of "sociology", an element of "science" is generally included. Therefore, the chosen definition should suffice to demonstrate that the majority of sociologists believe that sociology should be a science.

denote natural sciences. In this essay, "science" is referring primarily to disciplines which employ the scientific method to study the subject matter. The notion of "scientific method" is usually referring to a process of generating scientific knowledge, which generally includes making observations, collecting and analysing data, as well as conjecturing and testing hypothesis and theories[2]. To avoid confusion, it would be referred as the 5-steps model.

Of course, questions such as whether sciences are really different from non-sciences, and whether there is only one single scientific method, are already worthy of debate. In fact, the so-called scientific method may change over time. For instance, Bacon's "scientific methodology" was criticized as "largely scholastic" and "unconcerned with mathematical measurement" (Sivin 230–231). To facilitate discussion, only the aforementioned 5-steps model would be considered in this essay, since it is the most commonly accepted.

Why should a discipline be considered as scientific when it generates knowledge using the 5-steps model? In my opinion, a discipline can fulfil the essential criteria of science by doing so. It should be noted that the criteria listed below are by no means exhaustive. There are various well-reasoned views on the demarcation problem[3], and it would be unfeasible to include all of them.

Empirical science aims to learn more about the world. However, the complex reality with its infinite number of facts makes it seem impossible for mankind to fully understand all of them. Hence, a selection must be

2 There are several different versions, with some being more detailed than the others (e.g. including induction and deduction), but the listed procedures are mostly included (Andersen and Hepburn). It should be noted that the notion of "5-steps model" also refers these close variants in this essay.

3 The demarcation problem refers to "the question of how to distinguish the science and non-science" (Resnik 249).

made. Scientists attempt to learn the universal features of things instead of the individual cases (Lindberg 20), so "the more general a law is, the greater is its value" (Poincaré 163). Therefore, the chance of recurring is one of the criteria for selecting facts, and scientists prefer simple facts that have higher chances of recurring (163). In fact, this is one reason why scientific theories are often reductionistic, tending to achieve a mechanical explanation of the universe instead of a holistic and organic one (Needham 218). The famous principle Occam's razor[4] is an example of this pursuit for simplicity.

Although simplicity is an important characteristic of scientific theories, it is not one of its criteria, for complex theories may still be scientific. Falsifiability is a widely recognized criterion, which means that "it must be possible for an empirical scientific system to be refuted by experience" (Popper 18). For example, according to this criterion, Darwin's theory of pangenesis[5] was a scientific theory because it was falsifiable, as Weismann's experiment later refuted it by demonstrating that "changes to the body over an individual's lifetime could not be transmitted to subsequent generations" (Watson 101).[6]

Being able to make testable predictions is another criterion that derives from the criterion of falsifiability. Using modus tollens, an incorrect

4 The principle stated that "plurality should not be posited without necessity", and thus prefer the scientific theory with the least number of assumptions among two competing theories ("Occam's Razor").

5 Darwin's theory of pangenesis proposed that embryos were assembled from a set of minuscule components called "gemmules" (Watson 101), and Darwin claimed that these gemmules were "produced throughout an organism's lifetime" and "exchanged in the course of sexual reproduction", so the changes that occurred during the lifetime of individuals "could be passed on to the next generation" (Watson 100).

6 Weismann's experiment discovered that cutting the tails off from mice would not lead to the production of tailless mice in the subsequent generation. However, according to Darwin's theory of pangenesis, tailless mice should have produced "gemmules signifying no tail", so their offspring should have been tailless.

prediction will logically imply that the theory is flawed[7], so a theory that can make testable predictions is inherently falsifiable. For instance, Newton's first law stated that "Every body perseveres in its state of being at rest or of moving uniformly straight forward" (Newton 67). Despite the fact that "there is no example of a physical object that has even a component of pure inertial motion" (Cohen 60), the predictions deriving from his theory are testable. One of the examples is its application to predict the reappearance of the Halley's comet (61–62). In addition, the "mathematization of nature" (36) can also be seen as facilitating scientists to make measurable and testable predictions. For instance, the study of qualities like velocities has now become "mathematical by definition" (35), thus enabling scientists to better analyse and predict the changes of these qualities. This also illustrates why well-defined concepts are often required in sciences, as the separation between quantity and intensity enables better explanation and prediction of motion.

Of course, one may argue that a discrepancy between the prediction of a theory and the observed reality does not necessarily disprove the theory. Take the movement of the planet Uranus as an example, scientists could not reconcile the data with Newton's laws of motion and gravity (Sheehan et al. 95). It was later discovered that the "off-track" movement of Uranus was caused by the presence of Neptune, instead of a flaw in Newton's theory.

In fact, scientists do not overthrow a well-established theory immediately when discrepancies are discovered, although deviations are greatly valued. Poincaré argued that the exception becomes important once the rule is well-established (164), as scientists start looking for differences

7 Modus tollens is a law of inference in propositional logic. Given "If A then B" and "not B", "not A" will be resulted ("Modus Tollens"). Employing this law, "if the theory is true, then the prediction deduced from the theory must be true", "the prediction is not true", so "the theory is not true".

instead of resemblances. Therefore, scientists would begin with differences where "the rule stands the best chance of being found in fault" (165). This idea is not mutually exclusive with Kuhn's theory of paradigm[8]. Kuhn only suggested that rather than conjecturing revolutionary theories, scientists usually tend to improve the existing paradigmatic theory first when they discover discrepancies. For instance, projectiles proved troublesome for Aristotle's explanation of motion, yet medieval scholars still tried to explain it using Aristotle's principle (Cohen 45). Even Buridan, who "took a first step towards quantifying impetus", can still be seen as "working within a conceptual framework that was fundamentally Aristotelian" (Cohen 46–47). Therefore, while I believe that Kuhn's theory has a point, it can at most be seen as suggesting conservatism at the stage of explaining the discrepancies, hence does not contradict Poincaré's ideas.

Speaking of paradigms, it must be mentioned that Kuhn used the existence of paradigm as a criterion for normal science. He argued that in the pre-paradigm period, although "the field's practitioners were scientists, the net result of their activity was something less than science" (13). While his argument has a point, this essay will not include the existence of paradigm as one of the criteria, because the definition of paradigm is complex, making the question of whether sociology has paradigm a topic worthy of an essay in itself. Therefore, this essay would only use falsifiability as the criterion of empirical science.

8 Paradigms can be seen as "accepted examples of actual scientific practice" that "provide models from which spring particular coherent traditions of scientific research" (Kuhn 10). They have two essential characteristics: 1. Their achievements were "sufficiently unprecedented to attract an enduring group of adherents away from competing modes of scientific activity" (10); 2. They were "sufficiently open-ended to leave all sorts of problems for the redefined group of practitioners to resolve" (10).

III. Is Sociology a Science?

The question of whether sociology is a scientific discipline has two levels, the practical level and the theoretical level. The practical level involves evaluating actual studies done by sociologists, while the theoretical level involves evaluating the "orthodox" research strategies that are taught in textbooks, which are strategies that sociologists believe should be adopted. This essay would only consider the latter.

Research strategies in sociology can be crudely classified into two types, quantitative[9] and qualitative[10]. Although such dichotomy ignores the variations among each category and fails to include mixed methods research, it is still a useful distinction. At first sight, quantitative researches are separated from qualitative research by employing measurement. However, many writers have suggested that the differences between quantitative and qualitative research are "deeper than the superficial issue of the presence or absence of quantification" (Bryman 35).

Bryman suggested that three aspects could be considered (35). It should be noted that these are only beliefs that generally associate with the approach, but are by no means necessarily linked with it. Firstly, regarding epistemological differences, quantitative research tends to incorporate methods used in natural sciences to study the social world (27), such as the quantification of qualities. While qualitative research usually prefers interpretivism[11], emphasizing more on how individuals understand and

9 Examples of quantitative research design include structured interviews, questionnaires, structured observation and content analysis.

10 Examples of qualitative research design include ethnography, participant observation, qualitative interview, focus group and conversation analysis.

11 Interpretivism advocates the use of "a strategy . . . that respects the difference between people and the objects of natural sciences", requiring social scientist to understand the subjective meaning of social action (30).

interpret their social world (29). Secondly, regarding the relationship between theory and research, quantitative research often involves the testing of hypothesis derived from theories, while qualitative research usually attempts to generate theories from the data collected (20–27). Lastly, regarding the ontological orientations, quantitative research inclines towards objectivism, viewing social phenomena as external facts beyond the influence of individuals (32–34); while qualitative research is closer to constructionism, believing that social phenomena are continually being accomplished and revised by social actors (33).

After introducing the general distinction between the two strategies, they will now be assessed separately. For quantitative research, the model of studying natural science is often employed, as researchers adopt an approach similar to the 5-steps model. Since they involve the conjecturing and testing of hypothesis, they are falsifiable. Therefore, quantitative research can be considered as scientific theoretically.

On the other hand, qualitative researches are closer to hermeneutics epistemologically, emphasizing more on the "interpretive understanding of social action" (Weber, qtd. in Bryman 30). As many qualitative researchers believe that the subject matter of social sciences is fundamentally different from that of natural sciences by having meanings, they therefore believe that a different methodology should be employed. In some ways, this view is close to Kandel's saying of "[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). Kandel stated that the brain "reconstruct[s] our perception of an object", and the issue is "how electrical activity in neurons gives rise to the meaning" that individuals ascribe to the object perceived (185). Similarly, qualitative researchers tend to believe that our perception of the world is socially constructed, meaning that society introduces certain ideas into

individuals, and thus affects how individuals perceive the world and attach meanings to objects. For instance, an Indian may consider a girl beautiful, while a Canadian considers her as ugly. Therefore, one can say that both neural scientists and qualitative researchers are interested in "how an objective phenomenon . . . can cause a subjective experience" (186). They also share the belief that contemporary science is a "reductionist, analytical view of complicated events", yet "consciousness is irreducibly subjective" (186). Consequently, these researchers are less concerned about being scientific, because they are attempting to understand how individuals make sense of the world (30), and they believe that such subjective experiences are irreducible. As a result, qualitative studies seldom involve the testing of predictions. They are also unlikely to be falsifiable, since researchers can interpret deviations in a way that fits their theories.

However, rather than accusing qualitative researches of being non-scientific, I believe they should be viewed as a division of labor within the field. In fact, one may view qualitative research as the observation stage of the 5-steps model, since the results of qualitative research can be used for generating hypothesis in quantitative research.

IV. Conclusion

As Poincaré had said, many methods have been devised in sociology because none holds the field undisputed, which is why the demarcation problem is so important for the field. This essay crudely classifies social research strategies into two types, quantitative and qualitative. Using falsifiability as the criterion, quantitative research strategies can be considered as scientific. While qualitative ones stress on understanding how individuals perceive the world, hence qualitative researchers may not be concerned

about being scientific, since the current scientific methodology does not suit their objectives. However, I believe that qualitative research studies can be viewed as the observation stage of the 5-steps model of scientific method, as their results can be used for conjecturing hypothesis in quantitative research studies. Therefore, viewing quantitative and qualitative studies as division of labor within the field, I believe that sociology can still be considered as a scientific discipline.

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Teacher's comment:

Whether sociology is a science or not has been a controversial issue for a long time, partly because barely any well formulated, well tested theories comparable to the law of gravity come from the study of such a discipline. Poincaré even claimed that "it is with the greatest number of methods and the least results". Despite the difficulties in analyzing such a complex problem, Ka Wing (Fiona) managed to break it down to multiple, simpler levels and successfully present a well-organized and convincing argument to reach the conclusion. It is definitely a pleasure to read such an almost-academic paper. Congratulations, Fiona! The paper clearly shows the effort and time you've spent on studying the problem. In fact, after reading the paper for the first time I strongly encouraged Fiona to submit it to the *Best Essay Award* competition, as I had a feeling that it was going to win a medal. Wasn't I right? (Lai Chi Wai)