Is Replicability Necessary in The Production of Knowledge? Discuss with Reference to Two Areas of Knowledge

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Replicability has been considered a foundational aspect of knowledge inquiry for the past few centuries, particularly in the sciences. For different types of research, the credibility of experimental results that cannot be replicated, particularly within an empirical setting, is often undermined. This also applies to other areas of knowledge (AoKs), where establishing the replicability of research findings has been crucial for determining errors in the knowledge produced. However, knowledge inquiry is not always a perfect process; aspects such as bias and lack of absolute truth cannot jeopardize the replicability of knowledge. This thus begs the question of whether replicability is a prerequisite for the justification of valid knowledge within a specific AoK. This is what the prescribed title is inviting us to examine. Within this context, replicability will be defined as the ability of scientific experiments or trials to be repeated by experts to obtain consistent results. Is replicability required for the justification of knowledge produced? This essay will seek to establish that replicability is a necessary component in knowledge production by examining the natural and human sciences.

Natural Sciences

Replicability is a necessary factor in the knowledge production process in the natural sciences because it facilitates the independent verification of data and is also considered a significant principle of scientific research. In the scientific method, there are self-correcting mechanisms such as replicability that strengthen the validity of evidence and findings by ensuring that other researchers are able to reproduce the findings of a specific study. For example, John Ioannidis, a Stanford University, medical researcher, highlights the significance of

replicability by arguing that its necessity does not only stem from scientists trying to justify the 'correctness of results' but also guaranteeing the transparency of what transpired in a specific line of research (Ioannidis, 2014). Therefore, across the natural sciences, research is considered valid when an independent team is able to replicate a published experiment. Replicability can therefore be considered a significant part of scientists' process of building evidence that supports accepted theories. In the field of physics, the significance of replicability can be illustrated by the fact that a century after Albert Einstein presented the general theory of relativity to the scientific community, experts are still replicating his tests to establish the validity of his predictions (Norton, 2015). This has allowed experts to find, for example, where Einstein's description of gravity tends not to apply. Based on this information, it can be surmised that different disciplines in the natural sciences rely on replicability because it allows credibility to accumulate through independent replication, which makes it a necessity within this field.

Alternatively, one can also argue that replicability is not a necessity in the natural sciences because it is not the sole factor that determines the justification of knowledge. Due to aspects such as the limitations associated with the empirical method, it is evident that scientific theories can completely be determined by replication. In some cases, while the scientific community has accepted some theories and studies, their findings cannot be replicated. In recent years, this issue has attracted considerable interest within the field of science, with various studies producing evidence that shows that research might not always be reproducible. For example, in a 2016 survey conducted by Nature, the researchers revealed that in biology alone, 70 percent of researchers failed to replicate the findings of other experts. Moreover, approximately 60 percent of these researchers could not reproduce their findings (Baker, 2017).

Even in disciplines such as physics, replicability has been shown to be a problem due to the use of different methods and measurements. For instance, when it comes to the expansion of the universe, two groups of scientists have produced vastly different values, with one reporting that the universe is expanding at a 9 percent quicker rate than the other (Panek, 2020). This has created a great puzzle for scientists, with some terming that the discrepancies being reported to highlight why the nature of science complicates replicability. This research shows that replicability is not necessary when it comes to knowledge production in the natural sciences.

Human Sciences

In the human sciences, replicability is considered a benchmark upon which the reliability of findings or experiments is established and is, therefore, a necessity in knowledge production. Replicability has continuously been cited as one of the foundations of the scientific method. As such, the basic principle for knowledge production within this AoK is that an independent researcher should be able to replicate experiments under similar conditions and ultimately achieve the same result. Replicability, in this context, acts as a guide to whether experiments or findings contained any inherent flaws and whether the initial researcher paid due diligence to aspects such as the nature of the experimental design. Therefore, reproducibility is considered vital for fostering credible and robust research and for the promotion of scientific advancement. The significance of replicability can be highlighted by a series of studies that started in the mid-twentieth century by psychologist Walter Mischel referred to as the ‘marshmallow test’ studies. In these experiments, Mischel found that children as young as four could resist the temptation of indulging on marshmallows placed in front of them to hold out for a more substantial reward in the future, i.e., more marshmallows. This experiment proved that when these children grew

older, they were more likely to earn higher incomes and finish college. Since the late 1960s, this experiment has been replicated by different researchers. These studies reported that individuals who deferred gratification were more likely to receive higher SAT scores and become more competent (Watts, Duncan, & Quan, 2018). While, in a sense, these experiments might seem simplistic, they highlight the significance of replicability in the human sciences and why it should be considered a necessity.

To counter this claim, it could be argued that the nature of the human sciences ensures that replicability is not necessary for knowledge production. While this analysis has indicated that replication is considered a cornerstone of the scientific method, direct replication studies are particularly rare in fields such as psychology and sociology. These disciples are much more complicated because researchers have to rely on organisms such as human beings, which often exhibit a huge amount of variation when it comes to aspects such as behavior. For example, in 2015, scientists attempted to replicate 100 psychology studies, with the researchers only being able to replicate fewer than half of the studies (Handwerk, 2015). What this project showed that replicability is a problem that plagues the human sciences. In addition, scientific truth in the human sciences is not absolute but contingent on aspects such as context, time and method used. A factor such as time can create a different context for behavior, creating different experiences during the process of experimentation and rendering psychological phenomena innately variable. Therefore, this shows that replicability is not a prerequisite in terms of knowledge production in the human sciences.

Conclusion

All in all, this analysis has been able to establish the claim that replicability is necessary for both the natural and human sciences, particularly in reference to knowledge production. Replicability has been shown to aid data integrity in these different fields by ensuring that through repeated experiments, research or studies, the scientific community can confirm the validity of a particular discovery and facilitate scientific advancement. In terms of knowledge that has formulated a consensus, the most certain knowledge is that which has been replicated several times. However, it is essential to highlight that in some cases, such as the social sciences, replication is not necessary for determining validity. Due to factors such as methodological difficulties and sheer impracticality, replication is not possible. Regardless of this, these studies are still accepted by the scientific community.

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