**Word Count: 1591 Words**

**Title - Is replicability necessary in the production of knowledge?**

Replicability refers to the ability of an experiment to be repeated. It is used to confirm or reach a certain experimental conclusion. Replication is widely used to practically test and confirm knowledge. Though we may be able to reach a result theoretically, it is important that we are able to experimentally reach this result multiple times. Even so, can replicability always produce knowledge with certainty? In experiments where replication is not possible, could its results truly be considered as knowledge? To answer these questions, I will be exploring the areas of knowledge natural sciences and human sciences respectively. In the natural sciences, my perspective is that replicability is a powerful tool in the production of knowledge if scientists take assumptions into account. On the other hand, in the human sciences replicability could be misused which could lead to false interpretations of knowledge and ambiguity in the production of knowledge. I believe these AOKs help answer the prompt as they provide contrasting perspectives on replicability which are relevant in today’s world.

In the natural sciences, replicability is a useful method used to confirm and produce knowledge. The ability of the AOK to quantify variables proves useful. If an experiment is repeated and we obtain a similar value, we can confirm that new knowledge is produced as commonly seen in Physics. In Physics, the accepted value of acceleration due to free fall is 9.81 m/s2. This value was first calculated by Galileo by measuring the time taken for a ball to roll down each quarter of an inclined plane. He observed that the ball took an equal amount of time to cover the first quarter of the plane than the rest of the plane. [[1]](#footnote-0) Using this observation, Galileo was able to derive the value. This value is used even today because the **methods and tools** Galileo used in the 1600s still exist today. We can perform the same experiment using an inclined plane and a heavy ball and reach the same value. Since the experiment is **replicable** and the same values are obtained if the experiment is repeated, the **validity** of the knowledge improves.Replicability in this AOK acts as a means of **justifying** what is known to be the **truth**. Additionally, people who have replicated the experiment build **evidence** to show that the value is true. Here, replicability is also used to eliminate **bias** in values, as repeating an experiment can confirm knowledge if the same **value** is reached multiple times. Replicability in this case acts as a means of achieving **certainty**.

Though there are several cases where replicability is applicable in Physics, there are also cases where replicability is not possible at all. This is because several **assumptions** are often made in Physics to reach a certain conclusion. For example, in the topic astrophysics, dark matter and dark energy are **assumptions** made by physicists to explain the accelerating expansion of the universe which could not be explained by traditional laws of physics. It is assumed that about 95% of the world consists of only dark matter and dark energy, but practically there is no way of measuring them.[[2]](#footnote-1) Since both dark matter and dark energy cannot be physically seen, they cannot be quantified. This means it is impossible to experimentally confirm this value through replication. Though to a certain extent it is possible to visualize the effects of both dark matter and dark energy, because of the **underlying assumptions** it is not possible to replicate their effects perfectly. In this case it may not be appropriate to use replicability as a means of **justifying** knowledge as it may not be possible to replicate the effects of the phenomenon causing ambiguity. Through this we understand that in the natural sciences, at times **assumptions** are used to create knowledge. This may mean that the ability of the AOK to quantify **values** reduces, which also reduces the replicability of the AOK. During such situations, it may not be appropriate to use replicability to produce knowledge as it may be impossible to replicate the effects of the ambiguous phenomenon. When **assumptions** are created the ability of the AOK to **explain** phenomena reduces which in turn also affects the ability of the AOK to **quantify values**. This could potentially reduce the **relevance** of replicability.

This shows that the Natural Sciences supports the prompt when assumptions are not used to produce knowledge. This is because at times replicability acts as a powerful means to **justify** the **truth** due to the ability of the AOK to quantify **values**. Replicability in the Natural Sciences allows others to provide **evidence** for existing findings, hence producing knowledge. On the other hand, when several **assumptions** are made, the ability to replicate an experiment diminishes because the **assumptions** make it harder to quantify **variables**. This may mean that when **assumptions** are made in the Natural Sciences, it is difficult to practically **justify** a theory as the ability to replicate the phenomenon causing ambiguity reduces.

In the Human Sciences, replicability is used commonly to confirm knowledge, but at times due to factors such as demographics, age and wealth, replicability may be used falsely to produce knowledge. When performing experiments in human sciences like psychology, it is impossible to control all variables that may affect the outcome of the experiment. The replication of the Asch conformity experiment is an example of this (initially performed in 1951). In the experiment individuals were shown 3 lines of different lengths (labelled A, B, C) beside another line, and participants were asked whether A, B, or C had the same length as the other line. All participants (controlled participants) other than one (outlier participant), were instructed to give incorrect answers on purpose (for few questions). It was found that on the questions where controlled participants gave the wrong answer, the outlier participant was more likely to respond with the wrong answer as well. This experiment was replicated by two individuals named Perrin and Spencer in 1980[[3]](#footnote-2), but they obtained dramatically different results. Only in one out of 396 trials did the outlier participant join the controlled participants. This is likely because of the difference in controlled variables used in both experiments. The initial experiment consisted of 50 male students from Swarthmore College in the United States, but in the replicated experiment, only science and engineering students were used. Due to not considering control variables, experiments in the human sciences could have unintended consequences. This could lead to false or different results. The ability of the replicated experiment to act as a means of **justification** in this context may reduce as different results are obtained. Since different results are obtained, this makes it harder to make correct **interpretations** and acts as a barrier to achieve **certainty**. This makes it much harder to test for **truth**, making it easier to make false **interpretations**. This may mean that replicability may not produce a good means of **evidence** in the human sciences due to the differences in **culture** and **values** in a given sample. It could introduce more ambiguity in the production of knowledge.

Though replicability cannot be perfectly achieved in the Human Sciences, one could argue that replicability in the Human Sciences does not have to be perfect as it reflects the time in which the experiment was performed. This was the argument given by Perrin and Spencer when they obtained dramatically different results to that of the initial experiment[[4]](#footnote-3). There was a difference in time of nearly three decades between both experiments, and they argued that during this time, there was a change in **culture** which affected the results of the experiment. From this **perspective**, replicability does provide benefits as it can be used to change existing knowledge. Replicability can question existing **truths** and draw **implications** from them. Rather than acting as a barrier, new **evidence** is formed from new **values**. In this case, replicability does help us come closer to **certainty** as opinions are updated from new **perspectives** and **insights**.

This shows that in the Human Sciences there are two **perspectives** on the effect of replicability. The first argues that it is impossible to obtain the same sample twice, which may affect the results of an experiment. In this perspective, we are pushed away from the **truth** and **ambiguity** in the production of knowledge increases. The other **perspective** argues that since there is a change in time between experiments, the results may reflect the **culture** and **values** of people of that time. It may help update knowledge through new **insights**, coming closer to **certainty**.

Overall, we see that knowledge is often produced in Natural Sciences because others can confirm quantifiable values through replication, which acts as a form of **evidence**. When **assumptions** hold, it becomes difficult to quantify values and hence harder to confirm knowledge through replication. This means that to come closer to the **truth** in natural sciences people must be wary of **assumptions** reducing the replicability of an experiment, but if a quantifiable **value** can be reached **experimentally**, we can confirm that knowledge is produced. In the Human Sciences, it is nearly impossible to control all variables that could influence the results of an experiment. This could reduce the replicability of an experiment. Even so, it could reflect a change in **perspective** over time. This may mean that in the human sciences, it is important to consider all controlled variables in an experiment to reach the **truth**. Rather than falsifying an experiment based on replicability, it is important to consider the change in **culture** over time which may affect the results of an experiment.

**Bibliography**

1. “Dark Energy, Dark Matter.” NASA. NASA. Accessed December 2, 2022. https://science.nasa.gov/astrophysics/focus-areas/what-is-dark-energy.
2. Larsen, Knud S, Journal of Social Behavior and Personality; Accessed 29 November 2022, Corte Madera, CA Vol. 5, Iss. 4,  (Jan 1, 1990): 163.
3. Mcleod, Saul. “Solomon Asch - Conformity Experiment.” Asch Conformity Experiment - Simply Psychology. Accessed 30 November 2022. https://www.simplypsychology.org/asch-conformity.html.
4. “Motion of Free Falling Object - Glenn Research Center.” NASA. Accessed November 27 2022, NASA, July 21, 2022. <https://www1.grc.nasa.gov/beginners-guide-to-aeronautics/motion-of-free-falling-object/>.

1. “Motion of Free Falling Object - Glenn Research Center.” NASA. Accessed November 27 2022, NASA, July 21, 2022. https://www1.grc.nasa.gov/beginners-guide-to-aeronautics/motion-of-free-falling-object/. [↑](#footnote-ref-0)
2. “Dark Energy, Dark Matter.” NASA. NASA. Accessed December 2, 2022. https://science.nasa.gov/astrophysics/focus-areas/what-is-dark-energy. [↑](#footnote-ref-1)
3. Mcleod, Saul. “Solomon Asch - Conformity Experiment.” Asch Conformity Experiment - Simply Psychology. Accessed 30 November 2022. https://www.simplypsychology.org/asch-conformity.html. [↑](#footnote-ref-2)
4. Larsen, Knud S, Journal of Social Behavior and Personality; Accessed 29 November 2022, Corte Madera, CA Vol. 5, Iss. 4,  (Jan 1, 1990): 163. [↑](#footnote-ref-3)