

Is there solid justification for regarding knowledge in the natural sciences more highly than another area of knowledge? Discuss with reference to the natural sciences and one other area of knowledge.

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In light of the rapid development of countries around the globe, the ever-growing demand for knowledge and innovation has sparked a surge in the research of natural sciences - the acquisition of knowledge from the physical environment, and human sciences - the understanding of human behaviour. While both branches of sciences possess the common spirit of generalising complex phenomena to an objective piece of knowledge, one may regard natural sciences more highly due to its comparatively more tangible and direct contribution to an individual's quality of life, such as technology. However, human sciences also ensure the stability of societies by providing indicators for policy-making, which are crucial to humanity. While there is an apparent tendency for empiricists and reliabilists to regard natural sciences more highly, this essay aims to discuss why this claim may not be solidly justified by uncovering the flaws of employing such a rationale.

One of the theories for believing in the supremacy of natural sciences is its dedication to empiricism, particularly adherence to the renowned scientific method. The scientific method is a cyclical process in which the researcher tests for a set of hypotheses through inductive reasoning, forming concrete conclusions based on the empirical evidence gathered from experimentation. Because this process is highly systematic, standardised and rigorous, pieces of scattered knowledge can be easily assembled together to form a broader understanding and passed on to future generations. In 1662, chemist Robert Boyle observed the effect of volume of air in a closed tube against the air pressure, and by confirming the results across several trials, he devised the modern-day Boyle's law for ideal gases, which would be influential in the development of many future inventions, such as the piston engine in automobiles (Gooch, 2011). From this example, it is clear how empiricism and the application of the scientific method has led to important discoveries in natural sciences and hence its prestigious reputation.

However, while empiricism certainly does help the generalisation of unorganised knowledge, the apparent weakness is the obligation of obtaining conclusions strictly from empirical evidence. This is an extra layer of unnecessary self-limiting frameworks that massively undermines the forward progress of scientific discovery. In 1909, Albert Einstein proposed the "Falling Elevator" thought experiment, which supposes that a person in a free-falling elevator on Earth will experience the same effects as being in a spaceship travelling through deep space at constant velocity (Rohrlich, 1963). Though thought experiments were controversial at the time due to the lack of backing evidence, it successfully proved the equivalence of gravitational mass and inertial mass, which invoked a paradigm shift from classical analytical-based Newtonian physics to the more abstract theory of general relativity. From this example, it is evident that the success in natural sciences cannot be fully attributed to its particularly empiricist approach, but also stems from the creative philosophical imaginations of scientists.

Additionally, because of the highly rigorous nature of the scientific method, this empiricist approach of experimentation has influenced the rise in logical positivism in human sciences, which

promotes the use of logic and evidence-based inference to form conclusions. However, this positivist approach drew strong criticism from sociologists such as Jürgen Habermas, who argues that the scientific method is inapplicable to sociology due to fundamental differences in the nature of the test subject (Habermas et al., 1990). The argument goes that because sociology mainly investigates the psychodynamics of humans, it is highly stochastic and unpredictable and hence any attempts to impose rigid mathematical relationships on human behaviour are highly problematic. Moreover, because sociology involves the in-depth investigation of human thoughts, consciousness and mental states, constructing a set of predefined hypotheses is likely to shape the perceptions and expectations of the researchers, and hence potentially lead to confirmation bias, influencing the validity of the results. In contrast to natural sciences, it can be said that because atoms do not have consciousness, there are practically no limits to the form of observation, whereas humanists often have to account for contextual information and even resort to heuristics to avoid explicit measurement. Overall, while the success in natural sciences can be accredited to axiomatic empiricism, it does not imply that empiricism is the universally accepted method of explaining phenomena, and therefore, it is unsuitable to solidly rely on the empiricism of a particular branch of science as an indicator for its success.

Regarding the reliabilist justification of the success of natural sciences, one may attribute experiments as being highly consistent and reproducible, hence building trust on the belief that it is true. An example of this is the double-slit experiment performed by Thomas Young in 1801, who discovered the wave-like characteristics of photons by directing monochromatic and coherent light through two narrow slits, producing an interference pattern (Eichmann et al., 1993). Because this experiment will always produce the same pattern for a given wavelength and slit width, the lack of fluctuations between trials means a high degree of consistency. When reviewing literature for my Chemistry IA, I noticed that the experimental procedures are often detailed with an impressive amount of clarity, meaning that natural sciences are intended to be reproduced by other scientists, which also implies a high degree of testability and verifiability. Combined with the fact that most literature is accompanied by graphs and numerical visualisations, knowers can often easily parse the exact objective findings of an experiment, making the outcome of natural sciences apparently highly reliable and respected.

Conversely, human sciences may be less appreciated due to its subjectivity, in that theories often fail in different scales of spatial contexts, thereby raising concern on its reliability. An example is the Burgess Model in human geography, which theorises that the locations of commercial, industrial and residential land uses as being distributed in concentric circles around the Central Business District of a city, based on the observations made in Chicago during 1925 (Burgess, 1925). While this model was generally accurate in American cities, it failed to represent the distributions in European cities and terrainous areas, indicating that human geography is often highly spatially

oriented. As time progresses, this model also failed to account for contemporary urban and demographic processes such as gentrification and counterurbanisation, suggesting that geographical models are often inapplicable to the future because of the constantly evolving urban landscape. Thus, it can be argued that because there is virtually an infinite amount of interdependent socioeconomic variables in our society, small perturbations in such variables can lead to unpredictable changes in the future. From this, it is reasonable to assume that because geographical models may fail completely when not being updated in-time and specialised for the specific study area, and that models of the past are not testifiable in the present world, the outcome of human sciences appears to lack spatiotemporal consistency and reliability.

As demonstrated above, the outcome of human sciences appears to be less reliable than natural sciences. While it is now intuitive to use this inference to directly justify the belief that natural sciences are superior, it neglects the fact that reliability is perceived and can easily be exploited, whether maliciously or unintentionally. As an example, lobotomy was a neurosurgical procedure that is claimed to alleviate mental illnesses such as schizophrenia, by intentionally severing the prefrontal cortex. In 1949, António Egas Moniz was first to experimentally observe the emotionally blunting effects of lobotomy, which gained worldwide adoption, earning a Nobel Prize in physiology (Anastasia, 1984). Because this result is highly reproducible and verifiable in psychiatric hospitals, and also internationally commended by one of the most prestigious scientific foundations, lobotomy was believed to be reliable. However, it was exactly because of this overdependence on authoritative testimony that masked the ethical concerns of lobotomy, and combined with the later realisation of ambiguity of the data, much controversy arose and led to its eventual abolishment. This is a prime example in demonstrating that because human cognition can easily be manipulated, reliability alone cannot be used to justify the superiority of natural sciences.

On the other hand, while human sciences are demonstrably less reliable than natural sciences, the multidisciplinary nexus of various branches in human sciences serves as the fundamental backbone of our modern-day society. In 2015, the United Nations proposed 17 long-term sustainable development goals, involving ambitious goals such as eradicating hunger and combating climate change (United Nations, 2022). While such goals can theoretically be achieved solely through the advancements in natural sciences in an ideal world, many multinational corporations, conflicts of interests and cultural differences between nations are constantly evolving the world's sociopolitical climate, hindering the progress of sustainable development. Human sciences, while deemed unreliable in many contexts, are crucial in understanding and unlocking the deeply intertwined barriers between entities. For instance, with sociologists actively developing social innovation, economists fostering resilient markets and geographers investigating the demographics and distribution of resources, the combination of difference fields of human sciences are instrumental in influencing the policies and legislations around the world. Hence, given the

significant contributions of human sciences to our society despite its poor reliability, the reliabilist justification of the inferiority of human sciences could not be solidly held.

In conclusion, while there is an apparent tendency to regard natural sciences more highly due to its particularly evidence-based approach, which empowers the continual refinement of knowledge, the issues with confounding data causes the empiricist justification to not hold solidly. Combined with the fact that human cognition is highly subjective and prone to external influences, the reliabilist justification also does not hold solidly, and hence, the belief of the superiority of natural sciences cannot be solidly justified.

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