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Scientific Reasonings Regarding the Multiverse and Its Implications

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Abstract: The multiverse has been a heated topic under discussion as it belongs to a scientific concept, yet still has strong philosophical implications as direct evidence can hardly be gathered. This research analyzes the likelihood of the multiverse using classical scientific reasoning models, including falsification and the paradox of grue. The paper also discusses the impact of the multiverse on our free will, covering the notions of the time sequence, self, and the logic behind scientific developments. The paper concludes that the multiverse is so far rendered pseudoscience, and the situation may only change when science further develops. Although the multiverse is a theory that strongly challenges the notion of free will, the paper concludes that we should believe we possess free will to prevent the culture war and preserve all human emotions.

Keywords: Multiverse, Falsificationism, Grue Paradox, Free Will, Worldviews

1. Introduction

According to Engels, the limitation of our natural science today is still our universe. The infinitely many universes beyond ours are unnecessary for us to understand the natural world. However, as our minds and science progress, humans are driven by curiosity and wild imaginations to explore the universes beyond our perception, which is the multiverse, a theoretical concept denoting a collection of universes that are causally disconnected and whatever may exist beyond or between the boundaries of these universes. [1]. There are different definitions given to describe the multiverse. Some say that the multiverse is formed when people make choices in life. So, the multiverse could be created by our varying decisions, which the author here believes should not be held. Due to Kant's belief in freedom, the choices that we make are not a sign of free will, and our choices are affected by the society or nature around us. If such a definition holds, we are using a sociological way to denote the scientific term of the multiverse. The multiverse has been a heated topic for discussion under inflationary cosmology, anthropic considerations, and particle physics [2], and involves both scientific reasoning and philosophical logic. This paper explores the likelihood of the multiverse and the potential effects of assuming the validity of such a theory in the aspects of falsificationism and free will.

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2. The Likelihood of the Multiverse

To test the scientific reasoning behind the multiverse, it is crucial to first distinguish whether it satisfies the criteria of scientific reasoning. To this point, people still disagree about whether observational proof of the multiverse can be obtained. Suppose the multiverse has no testable implications [3], then it shouldn't fall into the category of scientific hypothesis. To discuss the likelihood of the multiverse, we should focus on what circumstances the theory should hold, instead of denying the multiverse in the first place due to the current limitation of gathering good inductive evidence. We should presume that the theory itself is testable for further discussion.

On a speculative level, the multiverse theory is very likely to be true. Lewis suggested that every way that a world could possibly be is a way that some world is [4]. Possibility lies in every aspect that logic holds. Therefore, we can only discuss the likeliness of the multiverse by denying its possibility to happen, in other words, using falsificasionism.

According to falsificationism raised by Karl Popper, scientific reasoning should fulfill two requirements: making observable empirical predictions and carrying out empirical tests [5]. Suspecting the existence of the multiverse could hardly fall into the scope of scientific reasoning as we are currently not able to make empirical predictions, directly receive signals, and enter the other multiverse. Max Tegmark believed that it is becoming increasingly clear that multiverse models grounded in modern physics can in fact be empirically testable, predictive, and falsifiable [6]. The cosmic microwave background theory and the constant development of science will allow us to arrive at supportive answers that can help confirm the theory. This, according to Tegmark, can only confirm the 1st level of the multiverse he proposed. There are four of them in total. The remaining three have no current means of testing. With more availability of combination of conditions, humans are thus able to find suitable conditions for our living. To some extent, the existence of our world indirectly proves the existence of the multiverse. But this indirect example provides little or infinitely small support for the concept of the multiverse.

We may only offer support for falsifying the multiverse theory, with no possibility of proving it. If confirmation is made based on receiving intended observed facts, we may fall into the fallacy of affirming the consequent [7], neglecting other causal relationships. Moreover, as supported by the Duhem Quine thesis [8], falsificationism may not be applicable in the multiverse theory. The multiverse theory is strongly connected with quantum physics, wave functions, and mathematics. Unless all the above auxiliary hypotheses are justified and recognized to be true, it is never possible to test the single validity of the multiverse theory.

Even if direct inductive evidence of the multiverse theory is observed, we may still fail in predicting the validity of the theory and may even reach contradictory conclusions according to Nelson Goodman's Grue paradox [9]. Despite acquiring good inductive evidence, our concepts relating to the multiverse can generate differing predicates. Thus, opposite conclusions are made.

Goodman uses the varying definition of the color of the emeralds, which in this case, we similarly create an example regarding the multiverse. Suppose we define a new concept called dispansion, meaning that the multiverse first expands and then shrinks after it reaches a certain moment of time. Thus, by our empirical observation, since we haven't surpassed that time limit, we may conclude that the universe is expanding, and draw the conclusion that the multiverse is both dispanding and expanding. Such a conclusion is contradictory, as it states two conditions of the multiverse when there should be only one. Discussing the Grue Paradox in the multiverse context doesn't necessarily mean that we are not able to reach agreements through inductive evidence, but indicates that the concepts made to the multiverse need further clarification. To make multiverse theory hold, we need more evidence for the establishment of a more solid foundation of concepts

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and experimental observations that are so far inaccessible. As the theory develops, more non-ad-hoc modifications need to be made, and there are no single proofs or falsifications for the theory.

According to Martin Gardner and George Ellis, current confidence in the multiverse is only based on faith and aesthetic considerations [10]. The multiverse theory by now is more of a logical imagination. But when it comes to the discussion of the physical world, it should have constraints of theoretical proofs and observational data, and not only make logical sense. Merely discussing the imaginary multiverse makes the whole concept stuck at the speculative level and should not be pursued for serious scientific explanations.

In this way, the study of multiverse with no observational proof should lean more towards philosophical reasoning rather than scientific hypothesis, as it fails to fulfill the requirements of testability and explanatory relevance [11]. The theory of the multiverse can so far only fall into the category of pseudoscience, as it does not meet Lakatos's classification of science as he proposes that scientists regard the successful theoretical prediction of stunning novel facts – such as the return of Halley's comet or the gravitational bending of light rays – as what demarcates good scientific theories from pseudo-scientific and degenerate theories [12], and is believed to be irrefutable by Popper [13]. However, such a categorization is only possible due to the current constraints of technology and observation. It does not imply that the multiverse to be mere fantasy. As we progress, multiverse theory is likely to be validated.

3. The Theoretical Implications and Effects of the Multiverse

Thus, the multiverse is a representation of infinite possibilities that are played in infinite universes. All possible worlds are existing worlds, and according to Lewis [14], they are just as our real world. Since we could not access the multiverse, it is only possible for us to observe and believe that the multiverse exists and have differing reactions based on our perceptions. The "infinite" notion of the multiverse sets an idea that even though we might not be able to observe every piece of ourselves in the infinitely many universes, we possess the ability to do so, and are grasping the concept of infinity that has never been achieved in our previous lives. In this sense, our free will has been emphasized as we can choose to see different versions of ourselves, and different versions of the world in infinitely many universes.

But this approach to inexperienced reality is questionable and is even destroying our free will. By Lewis's account, we assume that the laws of nature hold favourably in more than our own universe [14]. As time is only part of the dimensions, it can vary in different universes, forming a non-linear timeline at the same moment. The disrupted time sequence of the different universes indicates that our lives may be programmed, as one could be experiencing one situation now, while the "same person" in another universe has already experienced it hundreds of years ago. In this way, no matter how time progresses, we will invariably make the same choices even though we claim to have the ability to think independently. We may just be some programmed parts of the larger entity. In this way, the existence of the multiverse has eliminated our free will, and our actions could only be accounted for something beyond our perception, conforming to the watchmaker analogy. Calle applies the blind watchmaker analogy to the multiverse, and states that the universe can be explained with the laws of nature, its watchmaker. [15]

Furthermore, the actualized belief in the existence of the multiverse questions the notion of free will more than ever. If one can make differing decisions in different multiverses and can create different kinds of lives in different multiverses, then we can conclude that free will exists. However, if one's life is fixed no matter what different choices one makes, only making differing decisions while having the same destination is still threatening the notion of free will. In this way, however small variations we can make, we are still tiny, programmed parts of the multiverse. The questioning of free will relies on the notion of "self", but whether the "self" concept in the

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multiverse exists remains questionable. From a functionalist's perspective, even in this universe now, our "self" may still be projected by the objects that is around us. Such objects include our streams of consciousness, but the true "self" could, in fact, be missing. Thus, the multiverse is presumed to have a grander design that produces life as well as the natural order [16]. In this sense, the free will of individuals can only be neglected as they all serve for the grander design with purposes.

Lastly, the moment when humans can validate the existence of the multiverse must be a time when theories and technologies are well developed. Though the multiverse is proved true in the context, scientific reasoning, classification, and logic that we have progressed so far through the occurrence of the mathematical crises, the suspicion towards Newtonian physics, and the establishment of the quantum physics have proven us that there are no absolute correctness or falsity, and that laws are all in constant replacement for better combination of simplicity and informativeness. We now have rendered the multiverse to be true, but the ways and methods can be put at scientific risks at any time. Humans then must know that through the first brave hypothesis of questioning the whole universe, the proposal of the "whimsical" theoretical beliefs, and eventually the striking validation of multiverse, they are pursuing in the field of science through their senses, their beliefs, their modifications, and the willingness to accept their mistakes anytime with no hindrance over the indulgence of their past glories. Philosophical questioning and human beliefs may be changed along with the validation of the multiverse, but the spirits and logic behind science itself are never altered.

4. The Development of Worldviews until the Multiverse and Its Impact on Free Will

When looking backward in history, myths and symbolism were first used to depict the universe beyond our understanding. Mythocentric is used to describe the time period when people see through the universe with imaginative lenses and religious beliefs. Different areas have different ways of describing the world. The Chinese believed the world to have a square foundation and a round dome, while the ancient Indians believed their world was carried by three elephants standing on the giant shell of a gigantic tortoise.

Around 300 BCE, Greek started to experience the shift between the Mythocentric era and the Geocentric paradigm. Philosophy, observation, and the beginning of science were being used to estimate the world they were living in. Eratosthenes and Cyrene calculated the Earth's approximate radius and circumference, and even a small minority of Greeks, such as Aristarchus, believed that the Earth rotates around the sun.

Moving into the 15th century, Copernicus became the leading supporter of the heliocentric model with his work of De revolutionibus orbium coelestium, along with Johannes Kepler, who raised the three laws of planetary motion. Despite the fact that strong opposition towards the heliocentric model was proposed by the Catholic Church, the heliocentric model was eventually widely accepted in the 1660s.

With William Herschel's discovery that the sun in our solar system isn't that much unique considering its location, the Galactocentric Paradigm replaced the previous heliocentric model. Precisely calculated evidence of the Milky Way and the strong enhancement of astronomical development made people realize that there are other star systems other than the Solar System. The Universe-centric Paradigm replaced the Galactocentric Paradigm as Hubble made his discovery of the decrease in brightness of stars and over a billion of other existing galaxies.

With later developments, humans' understandings have gradually shifted from the Accelerating Universe Paradigm to the Inflationary Multiverse Paradigm, with leading scientists Albert Einstein, Stephen Weinberg, Vera Rubin, etc. With more and more estimation and theories made, we are having wider and wider ranges of hypotheses and scopes of scientific observations. But our theories

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and calculations are more relied on previous theorems and laws, and the results that are derived are always put at risk for open challenges by later scientists.

In the past era of the Mythocentric Paradigm, humans envisioned a world that was based on merely their imaginations. Free will can be easily emphasized, and people are able to make any suppositions. With the advent of modern science, free will has almost been rendered obsolete. By public intellectual Yuval Noah Harari, free will exists as an anachronistic myth, having been useful in the past, motivating people to fight against tyrants and oppression. Yet it is obsolete in the modern period with the development of science. Through large quantities of machine learning and data analysis, human actions are very likely to be predicted, and our choices can be predicted and manipulated with given stimulation to the brain.

Multiverse theory is raised under such circumstances, where the existence of free will is powerfully challenged. Instead of believing that we have the ability to make varying decisions with different outcomes, people have started to believe that sometimes events occur for unaccountable reasons and that the differing decisions are not generated by our free will. The case of Charles Whitman in 1966 further questions the existence of independent free will, as the tumour in the brain can obviously alter one's behaviour. In certain multiverse concepts, the differing choices that one makes in one multiverse indicate that the same person is destined to make another choice. Not to discuss the real definition and whether ego exists in such a context, the definitive of making another choice directly challenges free will.

Although people argue that the multiverse challenges the existence of free will, as in Sam Harris's book Free Will [17], believing the inexistence of free will will lead to a culture war, and all human relations such as friendship, love, and kindness will all be questioned to their existence. Believing another self in another unobservable universe may threaten our real sense of self, and our personal value may be changed. Through the development of science and the concepts of the multiverse being perfected, the notion of free will is destined to be challenged. While knowing the potential impacts of the challenges, professor Saul Smilansky holds an illusionism approach. Although knowing that free will is conventionally unreal, people should still believe otherwise–holding on to their free will to preserve their value to themselves and living in the society.

5. Conclusion

In conclusion, the multiverse cannot be falsified, nor can it be directly validated, and is only by now pseudoscience. Technological progress has hindered the progress of the multiverse theory. If the theory is true, our free will will initially be emphasized, but it will eventually be questioned to its existence, contributing to the greater design of the universe. While beliefs may change, scientific logic remains solid and heads for continued development.

With developments made in perceiving the world, people's free will have been questioned to existence. Although free will, on many occasions, fails to exist, it is still necessary to hold on to believing free will in our lives, preserving the values that we cling to in society.

The substantiation of the multiverse theory is a question that requires further exploration. However, the discussions towards the multiverse itself should never be limited, as they reveal our wildest imaginations and evoke strong debates that reflect on our current world. The independent reasoning and methodologies posed by the philosophical topics of science are clear implications of humans who strive and prosper, eventually becoming real seekers after truth!

Despite offering conclusions on the current situation of the multiverse, this paper is still largely based on analysis of past philosophical and scientific achievements. Because the multiverse theory hardly has any solid proof, the analysis in this paper still discusses the concept under different possibilities. For further research, detailed exploration in particular fields of free will, falsificationism can be pursued.

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