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Redefining Time: A Revolutionary Framework of Time and its Implications

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***Abstract*—This paper examines a novel approach to defining time in physics and evaluates the theoretical soundness of this idea across various domains often associated with the concept of time. The initial section addresses the common misconception that time is an independent quantity, using psychological proof to advocate for a redefinition in physics. Following this, the process of time perception is explored, thus leading to the derivation of a general formula for time perception. Subsequently, the new concept of time is applied to the phenomenon of time dilation, presenting a fresh perspective that challenges the notion of the constancy of the speed of light through proof by contradiction. A thought experiment is applied to clarify the misunderstanding regarding the relationship between entropy and time. In the final section, the potential for time travel is discussed, concluding that it may indeed be feasible.**

***Index Terms*— Time, time perception, time dilation, entropy, arrow of time, time travel, perception systems.**

I. Introduction

The notion of time has its roots in ancient civilizations, originating thousands of years ago. An early conception of time was developed in ancient Egypt and by the Babylonians, who, according to archaeological findings, began measuring time at least five thousand years ago. They introduced calendars to organize communal activities and public events, schedule the shipment of goods, and regulate agricultural cycles. Over the centuries, various timekeeping devices emerged, including sundials, water clocks, and the mechanical clock invented in 1283. For many years, the periodic ringing of bells in town churches or clock towers demarcated the day for most individuals. By the fifteenth century, however, an increasing number of clocks were being manufactured for personal use, gradually becoming integral to daily life. The pursuit of greater precision in timekeeping culminated in the invention of atomic clocks, and in 1967, a second was defined as "the duration of 9,192,631,770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the cesium-133 atom." This outlines the historical development of time as a concept and its assimilation into everyday life. Nevertheless, scientists have consistently sought to comprehend the true essence of time, leading to the emergence of various theories.

A. The Different Theories of Time

From a scientific standpoint, numerous theories regarding time were proposed.

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Aristotle was among the first to posit that time is not a standalone entity but rather a measure of change. He contended that 'absolute time' does not exist, laying the groundwork for ideas later reinforced by scientists such as Einstein. In the middle Ages, Christian philosopher Thomas Aquinas embraced Aristotle’s view while asserting that time was created by God, beginning with the universe's birth and concluding with its end. During the Renaissance, Galileo challenged the perspectives of both Aristotle and Aquinas, arguing that time is a fundamental property of the universe rather than a measure of change and asserting that it is independent of divine creation. In the nineteenth century, James Clerk Maxwell introduced his theory of electromagnetism, demonstrating that time and space are intrinsically linked, forming a single four-dimensional continuum of space-time. Finally, Einstein's theory of relativity transformed the understanding of time, aligning with Aristotle's notion of relativity while contradicting the Renaissance thinkers' belief in absolute time. In 1915, Einstein further connected time to gravity, explaining time dilation. Despite progress in comprehending time, several questions remain unresolved, including:

- Whether time existed before the Big Bang and if it has an endpoint,
- Why the arrow of time only points in one direction,
- The possibility of time travel and
- The relationship between entropy and time.

To appreciate the significance of timekeeping, one must reflect on periods before its formal establishment. For instance, if an individual plans to meet a friend at a specific location without clarifying whether it will be day or night, they may arrive at different times. This uncertainty prompted the creation of timekeeping systems in ancient Egypt, which evolved into increasingly efficient methods.

II. Historical Context of Understanding of Time

A. Differing Strands

The historical examination of timekeeping reveals a shared understanding that time was devised for daily life, utilizing materials with repeating cycles or oscillations. According to Cambridge University, time is "the part of existence measured in minutes, days, years", indicating that even definitions do not treat time as an independent entity. The notion that time is an independent dimension is a misconception that emerged in the middle Ages and remains uncorrected. Consequently, it is essential to differentiate between the flow of time and human-conceived metrics of time. If timekeeping is a human invention, time may not inherently exist within the universe. This leads to fundamental questions within physics, such as why individuals experience a forward progression of events, whether historical physicists were mistaken, and the implications of observed phenomena like time dilation.

B. Why Time is Not an Independent Reality

A pertinent question arises regarding why time is an illusion when it seems to govern events in daily life. For example, one might state that "the movie starts at eight," highlighting time's role in organizing experiences. In scientific terms, time is often treated as an independent variable, as evidenced by its use in defining measurements, such as the distance light travels in a specified time. However, the initial conception of time as a measure of change illustrates that early timekeeping devices were based on observable changes, such as the movement of shadows or fluctuations in water levels. Modern definitions of a second rely on the oscillations of caesium 133 atoms. Thus, since timekeeping is derived from change, it cannot be considered an independent entity within the universe.

III. How Time is Perceived

A. The Movements that Create Time and Whether Time Can be Stopped

Numerous theories regarding time suggest that individuals perceive time through the changes occurring in their environment. They notice a particular state in their surroundings, and when that state changes, they reassess it, leading their minds to develop a sense of time based on this integration of states. This understanding implies that time is external, fostering a misleading belief in independence. To explore this further, one can consider a scenario without movement, and everything remains still. The question arises whether the flow of time would cease in such a situation. For instance, if an astronaut were in a completely dark room, this could be viewed as an isolated system for examination. In this scenario, there would be no energy transfer or movement of light, and the astronaut would also be motionless. Even if he closed his eyes and silently counted the seconds passing—one, two, three—how could time be moving without any observable movement? The movement, it turns out, exists within him; his blood continues to circulate, and he is still breathing. Thus, internal movements within his body contributed to the perception of time flowing forward. It is noted that if body movements become steady, the cells involved in the perception system may also remain motionless, resulting in the inability to perceive time, which would feel as if it has stopped. Additionally, if there was another person with the astronaut in that room, and if this person's body movements had ceased while the astronaut continued moving, the friend would not perceive time and might feel it had come to a halt. In contrast, the astronaut would experience time flowing because of being capable of perception. Thus, if the friend's movements ceased and the astronaut counted five seconds until the friend's movements resumed, the astronaut would remember those seconds while the friend would feel he had jumped five seconds into the future, assuming his body would recover instantly without any complications. Another noteworthy phenomenon is a coma, where, unlike death, bodily movements persist, but consciousness gets lost along with the ability to perceive time. A person in a coma remains unaware of events occurring around him during that time because he is no longer able to process sensory information due to disrupted brain activity.

Therefore, time is not external but can be internally discerned by a person's perception system. We can define two factors that help in perceiving time:

- Changes in our body: The movements within us include chemical processes and the movement of substances and particles in our bodies.
- Ability to perceive time: the ability of our minds to be able to construct the forward arrow of time through our perception systems.

Note:

- If there are changes in a person's body, then he may not also be able to perceive time. But if he can perceive time, then there must be changes inside his body.
- Another thing is that the changes in a person's body give him the ability to perceive time, which is the reason for him observing a forward arrow of time. Hence, his internal body movements are the main reason for his ability to create an illusion of time.

B. Was time existent before the Big Bang?

Time, as already seen before, is unique for every observer and only exists for an observer if one can perceive it. Therefore, it is not clear that time did not flow before the Big Bang. It is just that it did not flow for us. If a human had witnessed the Big Bang, he would say time existed then because he perceived it. Finally, we can conclude that time seems to exist for observers when they can perceive time, and it seems to stop for them when they cannot perceive it.

C. The general formula for time perception

From the previous section, we can derive a general formula for time perception in the following manner:

If we denote the small change inside our body that helps us perceive one second as dx and if we denote the 1 second perceived time as α(with dimensions $M^0L^0T^1$), then:

$$\alpha \propto \text{dx} \qquad (1)$$

If we denote the ability to perceive time as k, then:

$$\alpha \propto k \qquad (2)$$

Therefore, $\alpha \propto kdx$ (3)

We know the dimensions of dx is $M^0L^1T^0$and that of k is $M^0L^0T^0$. α has dimensions $M^0L^0T^1$. To remove the proportionality sign, we need a constant with the dimension M constant).$M^0L^1T^{-1}$

Let us define this constant as $\boldsymbol{\tau}$

So, the equation (3) would become:

$$\alpha = \boldsymbol{\tau}kdx \qquad (4)$$

In this equation, α is the constant 1 second that we count we in our heads or our watch.

So $1 = \tau kdx$

or $\frac{1}{\boldsymbol{\tau}} = kdx$

as k = 1, for us to perceive time

$$\frac{1}{\tau} = dx \quad (5)$$

$$\text{Or } \boldsymbol{\tau} = \frac{1}{dx} \quad (6)$$

The amount of changes that occurs in our body for counting one second in our heads is what is dx. If the amount of changes occurred are more than dx then α would also be more than 1. Let's denote that as β. (so when β = 1, then we denote it as α). Let's denote that amount of changes occurred in our body between two observed states as Δx. This Δx denotes the net amount of changes from the initial state to the final state. So the amount of time perceived by us would be equal to

$$\beta = \tau k \Delta x \quad (7)$$

From equation (5) $\beta = k\frac{\Delta x}{dx}$

as k = 1, $\beta = \frac{\Delta x}{dx}$ (8)

This equation is the ultimate general formula for a time perception equation $\alpha = \boldsymbol{\tau} k dx$ is just a special case of (7)

D. The proof

The scientific idea we discussed does consist of logic and intuition, but science also needs proof of a phenomenon. This section will address whether there is proof that time does not exist and whether it is just a perceived illusion. This proof does not lie in mathematics but rather in psychology. A class of drugs called psychedelics, which consist of LSD and DMT, are proven to alter our passage of time. The exact mechanism of how that happens or what part of the brain these drugs affect is still under research, but various surveys and experiments do show a slower or faster perception of time in drug users. This effect is also observed in users of Xanax (an anti-anxiety drug). Another place where this effect seems to happen is in South America. In a ceremony termed Ayahuasco that involves drinking a liquid brewed from leaves from the Psychotriaviridis shrub and stalks of the Banisteriopsiscaapi vine. The brew causes changes in the state of consciousness, resulting in hallucinations and a significant change in the flow of time.[8] All these substances confirm that it is possible to alter time perception. Hence, time is only a perceived illusion because it can be stretched or contracted. If time was independent, then there could not have been an alteration with time. Even if these drug users carried a watch, although their watch would show the exact time, perception is altered. This is analogous to the change in the rate of time perception (in the section Time Dilation and the Speed of Light). In that case, gravity can change r, but over here, r gets modified by psychedelics and other substances. The research on these drugs has not yet been able to determine whether these drugs alter the speed of ageing and chemical processes in our body dx but proves that time is an illusion perceived by our perception systems. Even if they do not affect the dx changes, they might change the value of the time perception constant in a human.

IV. Time Dilation

A. The Science of Time Dilation in Humans

Throughout this paper it has been established that time is nothing more than a mere illusion. However, what about the various proven phenomena such as time dilation? This section will deal with these questions. Before applying the ideas mentioned in this paper let us talk about time dilation In general. Time dilation was the effect first theorized by Einstein as a result of his theory of special relativity, in which he proved that time flows slower for an individual near a strong gravitational field than for individuals near a weaker gravitational field. This effect was attributed to the stretching of the fabric of space-time itself. This idea was even confirmed by experiments, such as the Hafele-Keating Experiment, and Pound-Rebeka experiment. However! Throughout this paper, we have always tried to prove that time is an illusion or non-existent, or in other words, that time does not exist. So are we wrong and our reasoning fails in this case? Was Einstein and all the experiments wrong too? No neither we nor they were wrong, the idea of time flowing slower for a person in a gravitational field is correct. Although the reason behind it was wrong, it was not the fabric of time that was stretched by gravity but rather the observer's perception of time gets stretched for a person anywhere in the universe.

Then why does time flow at different rates? For some individuals it is fast and for some the k is constant, the only variable (α)depends on is $\boldsymbol{\tau}$dx individual slow compared to the first observer. Hence the relative speed of how fast those (dx) changes occur from person to person must be why time flows at different rates for different observers. It is proven through experiments that body movements slow down as the magnitude of the gravitational field we are in increases. Therefore,

$$dx \propto \frac{1}{g} \tag{9}$$

This hints that for the same amount of dx changes that occur, it is slower than a person in a weaker gravitational field. As the same amount of dx changes occur slower the length of one second will be longer compared to the observer in the weaker gravitational field. However, the two observers will not observe any difference. Let us take an example to understand this phenomenon and prove it more formally.

Let us say that observer A is near a black hole and observer B is on Earth. If acceleration due to gravity is g' near a black hole and g on Earth, then we already know that $g' > g$. If dx' is the body changes occurring in you while dx changes occurred in your friend then by

equation (3) we can prove $dx' < dx$ in the following way:

$$g' > g \tag{10}$$

We can assume an arbitrary constant to remove the proportionality sign in equation (10), hence,

$$dx = \frac{k}{g} \tag{11}$$

Substituting the value of g from (11) to (10), $\frac{k}{dx'} > \frac{k}{dx}$

Dividing both sides by k, $\frac{1}{dx'} > \frac{1}{dx}$

Multiplying both sides by dx',$1 > \frac{dx'}{dx}$

Multiplying both sides by dx, $dx > dx'$

Due to this decreased speed observer A's body changes faster compared to observer B. Observer A will age slower and also perceive time slower than observer B. In other words, time dilation can be thought of as the slowing down of dx due to gravity which keeps our alpha constant but changes the rate of time perception relative to another observer. Now to measure the relative time perception of two individuals we can define another quantity called the rate of time perception. We can define this quantity as $\frac{\alpha}{g}$. If we denote the rate of time perception as r then,

$$r = \frac{\alpha}{g} \tag{12}$$

$$r = \frac{\tau\, k\, dx}{g} \tag{13}$$

As alpha is a constant, we know that the rate of time perception will change solely based on the gravity acting on an observer. Hence, the rate of time perception can be used as a quantity to compare these between two observers:

- relative rate of body movements
- relative rate of time perception
- the strength of the gravitational field they are in.

B. Time Dilation in Other Objects and the Speed of Light

Gravity can influence the perception of time, as previously discussed, but the question arises whether it also affects other matter. For instance, the cesium-133 atom and atomic clocks provide a relevant example. The Hafele-Keating experiment, along with other studies, has demonstrated that time dilation does indeed occur. From earlier findings, it has been established that an individual's perception of time slows in a stronger gravitational field, leading to an increased relative duration of one second. If this principle is applied to a person situated in a strong gravitational field, it would be found that their watch would display the same value of alpha as they perceive. If the transition frequency of cesium-133 atoms remains unchanged, established concepts would appear flawed. Thus, gravity would act on the atoms in atomic clocks, proportionally reducing their transition frequency to ensure that alpha remains constant for both the observer and the clock. Extending this idea, if gravity affects all entities in the universe, it raises the question of whether light is also influenced. Assuming initially that the speed of light remains constant, the implication would be that bodily movements slow down while the speed of light stays the same. This scenario would suggest that the speed of light observed would exceed c (the constant representing the speed of light). However, it is known that light is consistently observed at a constant speed, provided the observer and the light are within the same gravitational field. This notion seems inherently contradictory. Yet, if gravity is assumed to impact light, this contradiction dissipates. If light experiences a gravitational force proportional to that acting on the observer, the situation becomes experimentally valid. Considering a scenario near a black hole, it would be noted that the rate of time perception would decrease. If the gravitational field has an acceleration represented as g1 at a distance d from the black hole, then at this radius, the speed of light would also be influenced by g1. Thus, since a proportional amount of gravity acts on light, it would slow down, allowing it to be observed at c. This thought experiment challenges a historical misconception among physicists: the speed of light is not a constant throughout the universe, but rather the speed of light perceived by a specific observer is constant. Therefore, if c' denotes the speed of light observed and c is the original speed of light, it can be inferred that c' changes according to gravitational influence. From this thought experiment, another important relationship emerges: the speed of light is inversely proportional to gravitational acceleration. If the speed of light is denoted as c, then it can be stated that ($c \propto 1/g$).

C. The Proof that Speed of Light Is Not Constant Historically:

The speed of light has been regarded as a constant in a vacuum. The previous section briefly suggested that this speed might change throughout the universe. To challenge such a foundational concept in physics substantial proof is required. It is known that light is affected by gravity, and velocity can change due to gravitational effects, though the magnitude of that velocity remains the focus. In a stronger gravitational field, ageing occurs more slowly, bodily movements are stretched, and the perception of time is also stretched. The observed speed of light remains constant. In a stronger gravitational field, as established, body movements would slow, thus stretching the rate of time perception. This phenomenon can be likened to watching a movie at half speed. If a light ray, travelling at (3*10^8) m/s, enters this gravitational field, it would cover a greater distance in the observer's extended second. Consequently, the light ray may appear to travel faster than c, assuming accurate distance measurements can be made. However, the observed speed of light never exceeds c. This contradiction arises from the flawed assumption that the speed of light speed remains unaffected by gravity. To ensure that the observed speed of light is constant, a proportional gravitational influence must act on light, slowing it down so it can be perceived as c. Thus, while the speed of light is not constant throughout the universe, it is always observed as a constant.

V. Other Speculations Related to the Concept of Time

A. Entropy Time Relation

Since the latter half of the 19th century, a term known as entropy has gained numerous definitions in physics and has often been associated with time. Entropy is derived from the second law of thermodynamics. Although various formulations of this law exist, two of the most recognized are as follows: Clausius Statement: Heat cannot spontaneously transfer from a low-temperature medium to a high-temperature medium, meaning heat transfer only occurs in the direction of temperature decrease. Kelvin-Planck Statement: A system cannot accept a given amount of heat from a high-temperature medium while delivering an equal amount of work output, implying that no heat engine can achieve 100% thermal efficiency. Conversely, a system can convert work into heat. The association of a thermodynamic law with time primarily originated with Arthur Eddington, who proposed that if an arrow is drawn and randomness in the state of the world increases, the arrow points toward the future; if randomness decreases, it points toward the past. This observation highlights the idea of ‘time's arrow,' which signifies the one-way property of time without an analogue in space. Following Eddington, many have sought to link the second law of thermodynamics to time. However, it is noted that there is no causal relationship between time and entropy; instead, their correlation is coincidental, with both thermodynamic and psychological arrows of time pointing in the same direction. Three scenarios can illustrate this point: Increasing Entropy: In the current universe, individuals remember the past but not the future, with their bodies functioning as open systems devoid of a thermodynamic arrow of time. Decreasing Entropy: If one were to exist in a universe where entropy decreases, a physicist arguing that entropy influences time perception might assert that individuals would remember the future. However, even in this scenario, individuals would still only perceive the current state of their surroundings and remember past events. Constant Entropy: If the universe maintained constant entropy, it would suggest a finite volume where energy reaches maximum entropy and remains stable. Yet, as open systems, individuals could still interact with their environment through mass and energy exchange, leading to the same outcome of remembering past occurrences rather than future events. These considerations, especially from the second scenario, lead to the conclusion that the perception of time is independent of entropy. It is merely coincidental that the psychological arrow of time aligns with the thermodynamic arrow of time in our universe. The misconception linking entropy and time has also been addressed by Arieh Ben-Naim in his paper, "Entropy and Time."

B. Arrow of Time

This raises the dilemma of explaining the one-way arrow of time: why do individuals remember the past but not the future? The concept of a one-way arrow of time was initially articulated by Arthur Eddington in 1927, though ideas of this nature had puzzled thinkers for a long time before that. The second law of thermodynamics, or the thermodynamic arrow of time, explains the psychological arrow of time, contributing to the misconception discussed in section 5.1. As previously mentioned, individuals perceive time because of changes in their bodies. They register the current state of their environment, and their brains store these perceptions, allowing for the recollection of the past. However, the future remains unknown because it has yet to be perceived. This aligns with philosophical views that assert the past and future are illusions, while the present is the only reality. Another question that may arise concerns why a glass that falls from a table always hits the ground rather than gathering itself and jumping back onto the table. The falling glass is explained by gravity, which keeps the glass and the floor in equilibrium, making the reverse action impossible. Due to the ability to remember, individuals can distinguish between forward and backward sequences, as demonstrated by reactions to a video of a glass falling versus one of it gathering itself. A person raised in an environment where glasses reassemble would be shocked upon witnessing the typical event of a glass breaking. This suggests that without memory, the concept of an arrow of time would be absent, and individuals would not contemplate the universe as they do. Historically, the arrow of time has been a profound concept, but it can be concluded that it is an illusion created by the capacity to remember past events.

C. Time Travel

The concept of time travel stands out as one of the most captivating ideas in scientific inquiry and science fiction. Initially framed by 18th-century writers as fiction, the notion gained significance in the 20th century when it appeared more plausible to scientists. Early ideas of time travel did not include machines but suggested that the past and future coexist simultaneously. Many ancient cultures acknowledged this notion, associating it with mythological beings. The first literary mention of a time machine appears in H.G. Wells's book, "The Time Machine" (1895). The earliest scientific theory suggesting the possibility of time travel emerged from interesting results within the special theory of relativity. However, no definitive proof has yet been established to confirm the reality of time travel.

Travelling to the Past

Before exploring questions related to time travel, such as whether it is possible or what mechanisms a time travel machine would require, it is important to reconsider the concepts of time, present, past, and future. In this paper, time has been defined as an illusion produced by human perception systems. The present has been characterized as the current state of the surroundings or the position of every particle within an isolated system. The past refers to the state of the surroundings or the isolated system before the present state, while the future signifies one of the potential states that the isolated system could evolve into. Since there is no evidence supporting the simultaneous existence of the past and future, an alternative idea for travelling to the past suggests that if one could return every particle to its initial position, time travel would be achieved. However, this would only eliminate the external displacement of particles, neglecting the internal processes that have occurred. To illustrate, if an individual is in a room, throws a ball against the wall, and catches it after it bounces back, the initial and final states of the isolated system would appear unchanged. Yet, chemical changes in the individual's body, such as ageing, would have occurred indicating that they influence the surroundings. Therefore, to genuinely travel back in time, people would need to reverse the chemical processes in their bodies and the physical processes affecting the ball. This would mean that the isolated system could return to its original state, both externally and internally, and thus one could claim to have travelled back in time. However, a problem arises: the individual would not retain memories of the journey, as those memories would also be erased through the reversal of chemical processes. There might be scepticism about whether it is possible to travel to the past and retain memories. One might propose exiting the isolated system and evolving it back to the state it occupied before exiting. While this would reverse the isolated system to its past state, the individual would still possess memories, which means they would not truly have travelled back in time but merely reverted the isolated system to an earlier condition. Thus, it becomes evident that time travel to the past is not feasible while retaining memories. Ultimately, time travel to the past is possible; it would simply require a machine capable of reversing all chemical and physical processes within the isolated system in the universe.

Travelling to the Future

Having discussed time travel to the past, the next consideration is travelling to the future. To address this, it is necessary to revisit the definition of the future. The future is one of the possible states that the isolated system, or the universe, can evolve into, indicating no fixed future. At any moment, the consciousness and decision-making abilities of individuals can alter the trajectory of the future. Therefore, travelling to the future essentially involves simulating one of the potential states of the universe. This means that to travel to the future would involve creating a future state and then bypassing the intervening events to reach that endpoint. Unlike the experience of not remembering time travel to the past, the future can be remembered. When travelling to the future, one would retain their memories, as those memories would not be erased while evolving the system.

D. Time is absolute as well as relative

Now for someone who does not know the back story, let us go back to the Renaissance period. Back then, Newton and other scientists thought that time and space was absolute. This means that they were not dependent on anything but were independent things and were constant for everyone. This idea was later revolutionized by Einstein by his general theory of relativity which proved that time and space, are relative and not the same for every observer. Applying the ideas discussed now, to perceive one-second dx changes are required in our body, the amount of change (dx) required to perceive a second is a constant for anyone anywhere in the universe. Thus, the amount of changes (dx) is absolute and constant. However, for a person in a stronger gravitational field, those dx changes occur slower than persons in weaker gravitational fields. Thus, pointing to the fact that the speed of those dx changes to occur is what is relative (depending on gravity) as the dx changes constant/absolute. And as$\alpha\alpha$ or one second in our heads is absolute/ constant, or one second in our heads is a constant natural perceived flow of time is absolute. On the other hand, we compare the rates of time perception between two observers in different gravitational fields by comparing the amounts of time passed in the clocks they were carrying. This tells us that time elapsed is relative. As time is measured by our metric systems, this pertains to that time in our metric systems that is relative. The time we invented is relative but the natural flow of time for a person anywhere in the universe is absolute. Isaac Newton founded classical mechanics on the view that space is distinct from the body and that time passes uniformly without regard to whether anything happens in the world. For this reason, he spoke of absolute space and absolute time, to distinguish these entities from the various ways by which we measure them (which he called relative spaces and relative times).[14][15][16]

This hints that Newton had some idea about the different types of time. However, there is no other evidence to prove his relativistic ideas.

E. Other Theories About Time

Time is a concept that has been around for a long time created by humans. Over the course of history, numerous individuals have proposed various theories regarding its origin, mechanics, and nature. The paper has examined many significant theories related to time. However, it also noted other theories, such as the block universe theory, the Many-Worlds Interpretation of Quantum Mechanics, Gödel's Rotating Universe, and Close Time-like Curves, which attempt to conceptualize time. Despite this, there is no evidence supporting the validity of these theories, leading to the conclusion that they cannot be considered accurate descriptions of time. Consequently, the paper has avoided utilizing these and similar theories, opting instead, to focus on well-established and proven concepts.

VI. Summarizing the Concept of Time

A. What is Time?

Throughout the paper, it has been emphasized that time must be defined differently in physics compared to everyday life. To articulate the natural perceived flow of time, it can be described as "the illusion of a continuous backdrop for events experienced by an observer, created by their perception systems and their ability to remember past events."

B. What Should Be Done About the Concept of Time?

The paper has characterized time as an illusion rather than a tangible entity. Thus, the question arises: should the concept of time be discarded? The answer is no. Timekeeping is vital to societal development; without it, progress would be hindered. Therefore, time cannot be dismissed, although in physics it should be defined as outlined in the paper.

VII. Conclusion

This paper primarily aimed to answer the question of what time is and tested various theories across different domains. Time is perceived as an illusion created by human perception systems and does not exist in any concrete form in the universe. Individuals perceive time through their sensory systems and the capacity of their brains to recall past events. The paper addressed whether time existed before the Big Bang, concluding that this depends on whether the observer was present there at that time. Time is perceived by an observer when their perception systems are functioning and ceases when they can no longer perceive it. Time perception is linked to the extent of bodily changes and the ability to perceive time. The formula for elapsed time in seconds is represented as $\beta = k\ \Delta x$, where β is a constant, k reflects the ability to perceive time, and Δx denotes the changes occurring in the body. The current understanding of time dilation should be reframed to describe the phenomenon of slowed bodily changes about an observer in a weaker gravitational field. While gravity does affect the speed of light, this difference is not noticeable because bodily changes are proportionally slowed. There is no connection between entropy and time; it is merely coincidental that the thermodynamic arrow of time in the universe aligns with the psychological arrow of time. The paper discusses the arrow of time and concludes that it is an imagined illusion stemming from the ability to remember past events. The concept of time travel, as depicted in science fiction, is feasible only if the time traveller can reverse every process within the isolated system, although this would result in the loss of their memories of the entire experience. An individual can travel to the future by simulating the isolated system to reach a possible future state. Time possesses both absolute and relative qualities. In physics, time should be defined as "the illusion of a continuous backdrop for events experienced by an observer, created by their perception systems and their ability to remember past events."

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