FUNDAMENTAL U-THEORY OF TIME. PART 1

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The Fundamental U-Theory of Time (Part 1) is an original theory that aims to unravel the mystery of what exactly is 'time'. To date very few explanations, from the branches of physics or cosmology, have succeeded to provide an accurate and comprehensive depiction of time. Most explanations have only managed to provide partial understanding or at best, glimpses of its true nature. The U-Theory uses 'Thought Experiments' to uncover the determining characteristics of time. In part 1 of this theory, the focus is not on the mathematics as it is on the accuracy of the depiction of time. Moreover, it challenges current views on theoretical physics, particularly on the idea of 'time travel'. Notably, it is a theory seeking to present a fresh approach for reviewing Einstein's Theory of Relativity, while unlocking new pathways for upcoming research in the field of physics and cosmology.

Keywords: Configuration shift, U-configuration, U-time, P-change, P-anava, time dilation, spacetime, special and general relativity.

Preface

If someone were to ask: what precisely is 'time'? After overcoming the initial bewilderment triggered by such a question, one may answer that time is something that one perceives as past, present and future. Others may advance that time is what causes entities to age or that it is simply what a clock measures. Physicists may contend that it is an essential component in the assessment of motion and space. Time is something that one certainly hates when one is waiting or when one is late, because it sombrely seems to drag in the former while it infuriatingly zooms past in the latter. To most people, time is a real phenomenon which is evident through night and day, the changing seasons and activities of our daily lives.

Nonetheless, devising a comprehensive explanation of time has been nothing but an impossible task for scholars throughout millenniums. From Aristotle to Einstein, everyone has fallen short of providing a complete theory explicitly on time. The concept of time remains conspicuously hidden in the midst of a dense jungle that makes the amazon forest look like piece of cake. Thus, for those seeking to gain clarity regarding this notion, let it be known that it's a jungle out there. The *Fundamental U-Theory of Time* is an original theory seeking to provide a step by step guidance through such a jungle, allowing the reader to finally uncover one of the greatest mysteries of all time: what exactly is 'time'?

1. Introduction

People uses the sun's position or the atomic clock to measure time. However, does 'time' really exist? If one were to remove the notion of time completely from one's mind for a few seconds, go back to 50,000 years ago and ask the question:

Would measuring the sun's position serve any purpose to ancient humans, if they were not seeking to measure time? The answer is that it certainly would.

Humans have always experienced a lot of changes and the solar time allows them to keep track of the changes they constantly experience, such as changes in the physical environment, human activities, microbiological change in humans and other living organisms, the aging process or daily changes in their surrounding habitat. To ancient humans, as it is to modern humans, one day is different to the next. In fact, one minute is different to the next. *The solar time or the atomic clock allows one to measure 'change' as opposed to time.*

What is the difference between 100, 350000 and 2 billion years ago? *The answer is not that each point of time represents different points in the 'path of time'. It is erroneous to think that time is something that flows or passes by.* The right answer is that each point of time is characterised by 'change' from a previous condition. What is the difference between 1second, a thousandth of a second and 10^{-22} second ago? The answer is the same: change. Things are always changing and things have certainly changed between 2 billion years, 350000 years, 100 years, 1 second, a thousandth of a second and 10^{-22} second ago.

The macro universe is not static it is changing. Within the microbiological world, of cellular activity, each fraction of a second is different to the next, due to changes from a previous condition. The quantum world is also always subject to change due to the constant movement of elementary particles. *Time is a conceptual and mathematical measure that account for such change.* Time is a symbolic representation of change, just like temperature is representation of heat. In that respect, to effectively uncover the mystery of time the real question for investigation should be "Does a clock truly measure time?"

2. What is a Clock?

What is the hourglass really measuring?
Fig.3.

It is erroneous to assume that that time is an entity that 'passes by' and that the hourglass is accordingly measuring the passage of time. The fundamental U-theory of Time proposes that time is intrinsically related to the hourglass. The hourglass experiences *a change occurring at each drop of a grain of sand* and time is a measure of that experience. The hourglass is subject to continuous change. Time is a measure of the rate at which change occurs with every drop of a grain of sand.

Similarly, the solar time is a measure of the rhythmic changes within the solar system. If the sun was shining all the time everywhere on earth, and if one's own human bodies never went to sleep, aged or underwent any change whatsoever, one would have a sense of relative timelessness. However, the cyclical changes of solar day and night coincides with the biological, physical, emotional, mental and social changes that are experienced by humans and other evolutionary species. The solar time is nothing but a type of change providing a yardstick to understand the intervals of changes that one constantly witness in one's human lives.

The solar system, an atomic clock or an hourglass can all be defined as types of rhythmic changes that allows one to measure changes in other systems. In this regard, any object that experiences rhythmic changes can be deemed as a clock. At the quantum level everything is subject to change, including an atomic clock. Time is the mathematical and conceptual entity that represents the changes experienced by a clock. Metaphorically speaking, it is time that measures the clock, rather than the other way round. The process, of using one type of change to compare with another, is what produces 'time intervals'.

3. What is 'Time'?

Thought experiment 1.

Let us assume that there are only fifteen elementary particles that exist in the entire universe, scattered at random as shown in configuration 1. In due course, one of them 'moves' away from its initial position, as shown in configuration 2.

Configuration 1 (C1) Configuration 2 (C2)

Fig.1.

Analysis

If C1 had never changed into C2, time would not exist. If all the fifteen particle shad always been in C1 and continue to remain in C1without ever changing, they would be in a state of *timelessness*. The notion of time and eternity would not even make sense in such a situation.

However, if C2 were to occur, time would be conceived, i.e. time would begin to exist. At this stage, time has nothing to do with speed and space. Time is simply defined as a change from C1 to C2. Measures of time could be assumed in terms of speed and distance through which such a change occurred, but time itself is simply 'change'.

Time thus corresponds to a *change* that occurs in nature.

If other particles began to move in whatever order, C1 would change chronologically into a series of other configurations such as C2, C3, C4, and C5.... As the configurations of the particles keep changing, time becomes symbolic of the changes that occur.

4. The Principle of Configuration Shift

Thought experiment 2.

Let us consider the following events:

Event 1.

There are 3 thousand stars in a galaxy. In due course another star is formed. What has changed?

Event 2.

A herd of deer are grazing the green grass, while they are being stalked by a tiger. The tiger walks very carefully and as silently as possibly toward the herd. He takes a pause, quietly positions his body in the attacking stance and subsequently engages in a powerful sprint. He successfully pounces on a calf, while sticking its claws and teeth into the calf's neck.

Finally, he eats most the deer, leaving the remaining carcass for scavengers to savour. What has changed?

Event 3.

Rome was built. What has changed?

Event 4.

A road accident occurs on the highway. What has changed?

Analysis

Change encompasses any event that occurs on earth and beyond, such as road accidents, radioactive decay, feeding, planetary orbiting, growth of plants, thoughts, leisure activities, volcanoes, chemical bondage, light, sound, galactic expansion, socialising, cellular activities, birth and death of stars, aging, love making, reading a book or the sunset. *All these events are essentially 'movement of subatomic particles'*. Our current knowledge suggests that humans, aeroplanes, brain cells and all living and non-living objects are made up of small particles of matter, called atom [Dalton, 1805] which is itself composed of smaller particles including electrons, neutrons and protons. The neutrons and protons are in turn made up of even smaller particles; known as quarks [Gell-Mann, 1964; Zweig, 1964]. Quarks and other small particles such as photons, gluons, Higgs bosons and neutrinos are referred to as elementary particles. *In this regard, any change including the formation of stars, a tiger ambush, the building of Rome and a road accident all amount to the movement of elementary particles that progresses from one configuration of elementary particles to another*.

Any event in the universe results from the '*motion at the subatomic level*'. Accordingly, change occurs in nature as a result of motion. Without motion there would not be any change. And without any change there is no time. *Time is thus the consequence of motion*. It is the fruit or offspring of motion. Where there is motion there is time, where there is no motion time does not exist. Time, therefore, corresponds to Configuration Shifts. *Configuration Shift* is a term explaining that any change, within the universe, comprises essentially of movement of elementary particles that progresses from one configuration of elementary particles to another.

5. The U-Configuration

Everything in the universe, including the universe itself, is subject to configuration shift. The *U-Configuration is* defined as the shape, form or configuration of the universe, before it changes into another, as result configuration shift. The U-configuration can be assumed to be unstable or fleeting for three reasons. Firstly, the universe is full of activities. Secondly, its elementary particles are not motionless, but vibrating [De Broglie, 1924; Davisson, 1928]. Thirdly, the universe is expanding at an increasing rate [Hubble, 1929]. All this suggest that the universe does not have a fixed shape or form and that its configuration is always changing.

The universe is thus a collection of elementary particles in motion progressing from one U-configuration to another.

As the Big Bang occurred, time spawn into existence where the universe, through the motion of its particles, is inexorably reconfiguring itself. Motion of subatomic particles is immense and continuous. It is constantly changing the fabric of every micro and macro entity and indeed the fabric of the universe. No micro or macro entity is the same as it was a trillionth of a second ago. The universe is in a ceaseless state of change. The U-configuration is not the same it was a trillionth of a second ago. The status quo simply does not exist in nature. Change is the essential nature of the universe, which is made up of elementary particles in constant motion. *The constant change, which occurs relentlessly in the universe, is encapsulated through the concept of time. Time is thus both the 'conceptual entity' that symbolizes the transient nature of existence and the 'mathematical entity' that accounts for the ceaseless change experienced by the universe, from one U-configuration to another.*

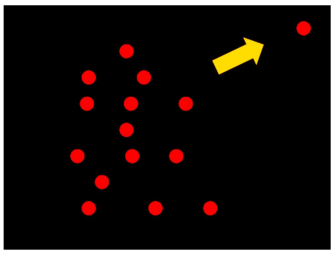
6. The U-Time

Reconfiguration of the universe is no joke or fantasy. It is real. It is happening as one is reading this piece of literature. One's body is not the same it was a millionth of a second ago, because there is constant motion in a human body at a subatomic level. In this regard, the human body is continuously reconfiguring itself every millionth or so of a second.

The universe is thought to comprise about 10^{97} elementary particles or potentially more if dark matter is included [Munafo, 2013]. With 10^{97} particles at stake, the potential combination matrix of U-configurations is enormous. The unit of time at which such change, in configuration, occurs would be infinitesimally small. *U-Time* [t_u] can thus be defined as a unit of time at which a U-configuration undergoes a configuration shift.

7. Measure of Change

Let us reconsider Thought experiment 1.
Fig. 2.



The particle moving away causes change. How is such change measured? Answer: the measure of change is time. Since time is a measure of change, a unit of time in this case will be based on the speed and distance. The greater the distance the greater the change. The greater the speed the faster the rate of change. In this regard, if the elementary particle moves away at very slow speed, the rate at which a change is incurred is very slow. If it moved a great distance, it would have incurred a massive change at very slow pace, i.e. through a large time interval. The faster the motion the smaller the time interval.

Is speed and distance the only determinants of change? The answer is no. If there are a thousand moving particles, albeit at slow speed, the rate of change would be much faster and the time interval smaller than that caused by only fast moving one particle. *Thus, motion-change depends on three determinants: speed, distance and number of elementary particles.*

8. U-Configuration Shift is much Faster than P-Change

Thought experiment 3.

Let us consider three hypothetical states of the universe, S1, S2 and S3 as follow:

S1

S1 consists of one motionless elementary particle. According to the U-theory, S1 would be timeless.

S2

Let us hypothetically assume that the universe is made of one single photon. Such a universe would be time-bound, as it would experience change through the motion of the photon. What would be the rate of change that S2 would be experiencing? Answer: the rate of change would be equivalent to the level of motion of the photon. If a photon was a slow moving particle (hypothetically speaking), it would cause the universe to change at a very slow pace. Since a photon moves at a very fast pace, it would engender a change through a very small time interval. In this case, it is plausible to assume the Planck time [t_p (5×10^{-44} s)] as a unit of time to represent the rate of change incurred by a single photon.

S3

In S3 the universe has 1000 photons in motion. The level of motion in S3 would be greater than in S2 and the level of change that the universe would now be experiencing would be equally greater. In this regard, the t_p, as a unit of time would not be small enough and no longer appropriate to represent the change incurred.

A photon moves one Planck length [ℓP (1.616199(97) $\times10^{-35}$ metres)] in one t_p. Accordingly, by the time a photon would cover an ℓ, the remaining 999 photons would all have moved an equivalent distance. Keeping the maths very simple, a more appropriate unit in the hypothetical situation S3 would be $t_p\times10^{-3}$, because the universe would have been able to reconfigure itself a thousand times each t_P. In essence, every t_P the universe would have experienced a thousand changes or reconfigurations.

Accordingly, the *U-Configuration* Shift is defined as the change from one U-configuration to another, whereas the *P-Change* can be defined as the change instigated by a single photon travelling one ℓ_p in one t_p.

Let us now compare the above situations to slow moving particles. An electron, E, that travel at $c \times 10^{-3}$ would cover one ℓ_p in 1000 t_p. Subsequently, it would require 1000 Es to instigate a change equivalent to p-change, but if there were a million Es they could instigate a thousand p-changes. Following this logic, a large number of slow moving particles can instigate the same level of change as a comparably smaller number of fast moving particles.

The universe is made up of fast moving particles such as photons and neutrinos as well as slow moving particles. In this regard, with 10^{97} particles at stake moving at great speed, the *U-Configuration shift is extensively faster than the P-Change*.

In part 1 of this theory, the focus is not on the mathematics as it is on the accuracy of the depiction of time. The specific formula to calculate the U-time shall be unveiled

in the Part 2. Nevertheless, it can be cogently deduced that the rate at which the universe continuously reconfigures itself is n^{th} times the speed it takes for one photon to engender a p-change. *By the time a photon traverses space in one t_p, the construct of the universe would have changed a trillion × 10^n times*. Accordingly, the U-time is infinitesimally smaller than the Planck time.

9. The Hypothetical Freeze and Timelessness

Thought experiment 4.

Let us consider three hypothetical states of the universe, S4, where all elementary particles (every single one) of the universe(s) froze to a standstill, as in C1. Would time exist?

Analysis

Assumption 1: Time is an unknown quantity that passes by, even in total absence of motion. This paradigm is unscientific. Currently time is a viewed as a mysterious entity in science, as no comprehensive explanation on time has been provided to date. There is a flawed assumption that it is something that passes by and that as science develops the 'it' is something will somehow be uncovered. The persistent use of such a paradigm will only keep humankind in the dark ages. This paradigm ought to be challenged through precise deductive reasoning.

Assumption 2: time represents change.

Time would not exist in S4. The concept of time would not even make sense. The universe would be in a state of timelessness. However, if only one tiny elementary particle should move, time would spawn into existence.

This is what 'time' is. It reflects change. A single motion of one tiny elementary particle will instigate a change, albeit infinitesimally small, in the configuration of the universe. The essential nature of elementary particles is that they have ants in their pants. They never remain still, but are always in motion. This implies that the U-Configuration is always changing as each of its 10^{97} elementary particles are always motion.

10. The Term 'Event' Hinders Understanding of Time

Time is often misunderstood, because of a lack of understanding of what exactly it is measuring. Einstein [1916, Ch. 09] put forward that "….unless we are told the reference-body to which the statement of time refers, there is no meaning in a statement of the time of an event." Such Einsteinium viewpoint is further echoed in the assumption that "Time has no independent existence apart from the order of events by which we measure it" [Barnet, 1948, p. 14]. Notably, the term '*event*' represents a major obstacle to accurate understanding of the nature of time.

What is the watch really measuring?

Fig. 4.

The term event generally denotes a significant activity such as feeding, road accidents, strolling along a river bank, the earth orbiting the sun, socializing, working etc. For that reason, a watch would be anything but an event. In that respect, it is quite easy to make the mistake of assuming that a watch is really measuring the passage of time. *The changes caused by the moving needle are not viewed as events*. Hence the reason that the term event ought to be avoided. Configuration Shift is a more appropriate expression because it encompasses ongoing change; *a change that the clock itself experiences*.

Currently one tends to ignore the boring changes that the clock is subjected to, because one is too focus on 'events' rather than change. The changes within the clock are important. *Each movement of the needle of any existing clock is changing the universe forever*. A time device is a reference framework that matches its own rhythmic changes to the chronologies of change of other systems.

In his 1905 paper on special relativity Einstein states that "The "time" of an event is that which is given simultaneously with the event by a stationary clock located at the place of the event, this clock being synchronous, and indeed synchronous for all time determinations, with a specified stationary clock." Clearly, Einstein viewed time as an independent entity that passes by, wherein events occur at a specific point in time during its passage. How accurate is his statement?

11. The Past, Present and Future

Einstein [1955, as cited in Dyson, 1979, p. 193] mentions that "... the distinction between past, present and future is only a stubbornly persistent illusion." According the U-Theory past, present and future are reflections of configuration shift. Let us consider the event of someone jumping from a high building, crashing on the ground and subsequently dying. The jump, the decision to jump, the crash and the process of dying are all motion of subatomic particles, i.e. configuration shift. The 'past, present and the future' is not an independent concept, but is a measure of change just as hot, cold and tepid are measures of heat.

Time is not an illusion but a mathematical reality and is truly another measure like temperature, speed, pulse rate or IQ. The only illusion here is a 'passage of time' or an 'arrow of time' out there, on its own. The actual illusion is that time is an independent phenomenon, passing away by itself. Einstein felt that people before him had mistakenly believed that time was structured in terms of past, present and future. And subsequently he deemed that it was necessary to challenge whether such structure was real or an illusion. According to the U-Theory neither is correct: time neither has structure in its own right nor is it an illusion. The separation between past, present and the future is not illusion. It is as real as it gets. Whatever structure that time possesses, it essentially reflects the inherent characteristic of change. *The passage of time is real and it is inextricably linked to the phenomenon that it is measuring i.e. configuration shift. However, when time is viewed without such inherent link it would appear as a convincing illusion.*

12. The Time-Rate Insolubility Hypothesis

The fallacy of the time dilation hypothesis is manifest in its assumption of a *rate of time*, i.e. the rate at which time passes. The time dilation hypothesis suggests time is observer dependent [Einstein, 1916]. This implies the rate at which time

passes differ from one observer to another, depending on the relative motion of the observer. Accurate clocks can thus tick at different rates. It is like saying "10 o'clock is going to pass in 5 minutes on my clock and in 48 hours on yours". The time-dilation hypothesis considers time to be an independent entity in its own right with its own rhythm and pace. In this framework, time is assumed to have a rate at which it flows, such as a minute per minute. If one travels at great speed, time could slow down to say, a minute per 24 hours.

Well, what is the speed of speed? What is the velocity of velocity? What is the temperature of temperature? Do feelings have feelings? What is the rate of time of time?

Time-dilation is accordingly an inconsistent framework. It would be consistent if time was a phenomenon, particle or force that passes by, but it isn't. Time is a measure of change, just like speed is a measure of motions of objects. Speed does not have a beginning or an end. It is not an independent phenomenon, but is inextricably linked to motion. If it was an independent phenomenon, it would then become appropriate to measure the speed of speed; but it isn't. In that respect, it is nonsensical to measure the time of time.

Another useful analogy is 'distance', which has no existence independent of particles. It is the existence of particle that provokes the existence of distance. Time is a measure of motion-change of just like distance is a measure of the position of the same particles. Imagine two particles distance apart — both the particles and distance exist. One cannot say that distance does not exist and that it is a mere illusion. However, the existence of distance emanates from the existence of the two particles. It would be illusionary to conceive distance as having an independent existence outside the existence of particles. Correspondingly, where there is motion there is time; where there is no motion time does not exist. The universe exists; therefore, time exists. The only illusion would be to conceive its existence outside the existence of the motion of particles.

13. P-Anava [pA] and the Cosmic Speed Limit

According to Einstein theory of special relativity, c is the same in all frames of reference, i.e. no speed or relative velocity can be assumed to be higher than *c* [Einstein, 1905]. Under this assumption, two photons travelling toward each other will still have a resultant velocity *c*. If the speed of light can't change, what can be held to account for the anomaly of the hypothetical light clock? Einstein concluded that if the speed of light is constant it must be time that was altered. In this regard, a moving clock ticks more slowly than a stationary one. The idea that time is inherently observer-dependent gave birth to the idea of *time dilation*.

The idea of time dilation rests on two logical, albeit, unproven assumptions: (i) the speed of light is the cosmic speed limit; (ii) speed of light is constant in all reference frames. The first assumption relies on the fact that since, a photon is the fastest traveling particle known to mankind, it appears reasonable to conclude that nothing can exceed the speed of light.

The second assumption relies on the characteristics of a photon and on how it is formed. Whenever an electron is energized it jumps to a higher orbit, and when it subsequently falls back to its normal orbit, it emits a packet of energy, which is a photon. The photon is born with the speed of *c*, i.e. it never has to accelerate to

such speed because it manifests into existence right at that very speed. Our current knowledge suggests that there is no evidence that a photon decelerate either. Light speed is observed to be lower than c when passing through a medium. However, this seems to be because photons are absorbed and re-emitted by atoms, causing a slight overall slowdown. Nonetheless, the speed of the photons as they travel between atoms is always *c*. In a vacuum a single photon can travel indefinitely, but in a medium it has a very short lifespan during which it always maintains its constant speed.

A photon has never been observed to accelerate, decelerate or travel at a speed other than c. No other elementary particles or entities have such constancy. Constancy is one of the striking features of a photon. Unfortunately, deprived of an ability to accelerate or decelerate, constancy is the cross that a photon has to bear.

Therefore, if a photon is limited by constancy, it makes perfect sense to assume that that 'limitation' (referred to as '*P-anava*', symbol pA) is what needs to be examined and accounted for in the lightclock or similar thought experiments. A photon cannot move faster, thus it undermines the accuracy of the lightclock. A lightclock is therefore inaccurate. A photon does not make a good clock, because it is haspA (limitation within a photon). The faster the moving lightclock the higher the resultant pA. The anomaly of the theoretical lightclock, or other related thought experiments, ought to be explained in terms pA, as opposed to time-dilation.

14. The space-time continuum hypothesis

The space-time continuum hypothesis hinges on the notion of time dilation, i.e. time is observer dependent. It is contended that time is a localised phenomenon, i.e. motion and speed varies from one point in space to another, thus time varies from one point to another. In that respect, one is confronted with a three dimensional universe with time variations scattered all over space, making up the entity called space-time. The notion of space-time conjures up the image of trillions of clocks scattered all over space like dust, all ticking at different rates. Under the Time-rate Insolubility Hypothesis, this fanciful notion fails to conceal its flaws.

It is understandable that if gravity is increased, it will take longer for an aeroplane to reach Australia. It is also logical to assume that if gravity can bend light it can also bend space. Events occur, not only in space, but equally in time. The inclusion of bendable spacetime within a coordinate system makes perfect sense and is most likely a mathematical reality. On the other hand, when spacetime is viewed as a traversable phenomenon it is symptomatic of a lack of understanding of what time really is and what it is that it is factually measuring.

The Einsteinian theory view time to be observer dependent, implying that objects in motion on earth operates at different times. *According to the U-theory, the sum of all change from the perspective of a slow moving particle is exactly the same as that from the perspective of a fast moving particle*. The rate of change is exactly the same for all observers. (NB: 'Rate' of Configuration Shift is uncovered on Part 2 of the theory). Time is the measure that encapsulates the change brought about by the particles in a system.

A slow moving particle views the change brought about by the particle itself and the change brought about by a fast moving particle, in exactly the same manner that a fast particle moving views this process. Thus, the change, brought about for

example by sunburn on human skin, has an absolute chronology from the standpoint of all elementary particles involved in such process. The timeline of the interaction, between photons and particles from skin cells, suncream, dust, air, would not be observer dependant, but would simply operate within the rule of causality.

15. Can One Travel Backward or Forward in Time?

Seeking to travel in time, within the Einsteinian paradigm, is like tearing apart a ten-dollar note in order to find food or gold. While Newton believed that the flow of time is absolute [Newton, 1687], Einstein contended that the flow of time relative. *According to the U-theory, time does not 'flow', but is merely a mathematical representation of configuration shift. It is configurations of particles that flow from one configuration to the next. Time is mathematical depiction of such flow. Time does not flow.*

Time travel in this framework implies going backward or forward at particular series of configurations of particles. The act, of two lovers kissing, is fundamentally movement of elementary particles unfolding through a series of consecutive configurations. However, the tricky part is that it has to be understood that such act operates simultaneously within the framework of 10^{97} particles. If someone sitting in a bus utters the word 'hello', he is really uttering such a word not only in a bus, but in the universe. Every change that occurs on earth or other location in the universe, also forms part of the universe. Every action, that takes place in a tiny location anywhere within the cosmos, does so within the framework of the U-change. *It is only logical to assume that a person travelling to his past or future will also be travelling in the past and future of the rest of the 10^{97} particles*. The search for time travel has to be conducted within the framework of the U-theory and not that of special and general relativity.

16. Conclusion — Dissolving the notion of time

Ironically, to understand the nature of time, it is best to begin by removing the notion of time altogether from one's thoughts and go back to ancient humans 50, 000 years ago. Consequently, one is able to comprehend that life or existence is underpinned by one fundamental principle, i.e. 'change'. Things are always changing and things have certainly changed from 13 billion years to a Nano second ago. Configuration shift or 'change' is an ultimate truth that does not require the notion of time to fathom.

Conversely, time cannot be fathomed without the notion of change. *All changes, from the formation of stars to the waves of oceans or from decay of rocks to daily human activities, are all essentially 'movement of elementary particles 'shifting from one configuration of particles to another. This configuration shift is depicted in the notion of time.*

Ultimately, the most fundamental change is one that the universe, as a whole, experiences. If one were to ask: "What is the configuration of the universe?" one would be spot-on to answer that "It doesn't have one". The universe is always changing and it has been subject to change since its inception. Time is a measure that captures the universe's experience of change that inexorably unfolds, one after another. Time is not an independent entity that flows. If the elementary particles that make up a beautiful person were to freeze, time would freeze too and the beautiful person would not age. If the 10^{97} particles of the universe were to freeze, time would freeze

too. *Time is no more than a measure, a representation, a mathematical concept or a symbol. Time is not what a clock measures, but it is, more accurately, what a clock experiences*.

The flow of time, that everyone senses and is baffled by, is a conceptual and mathematical measure that represents a real life day-to-day process: configuration shift. Configuration Shift the flow one configuration of elementary particles to another. Time is a scientific interpretation of such flow. Time does not flow. *To conclude time can be defined as the mathematical representation of configuration shift or 'change' in the layperson's term*.

Great thinkers such as Poincare, Lorentz, Einstein, Minowski and others from ancient civilizations started the analysis, but the debate remains very much open. Aristotle advanced that time is "…something dependent on change…" but fell short in explaining the essential characteristics of 'change'. Yet 'change' is central to this debate. The U-Theory contends that it is not possible to fully comprehend the nature of time without seeking to comprehend what exactly it is measuring. Such question, if left unsolved, may hamper true progress in science. The Fundamental U-Theory of Time is hopefully a decent effort in the right direction. Physicists and cosmologists are invited to critic and take this theory to another level and to new frontiers in the pursuit of unveiling other hidden characteristics of time that are, perhaps, not yet fully established in this paper.

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