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Unifying Matter, Energy and Consciousness

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Abstract. We modelled consciousness to explain how it interfaces with the brain and interacts with matter and energy. As per the mode, consciousness is a fundamental law of nature and life or reality. Regardless of the brain's massive parallel-processing capability, consciousness has been defined as a high-speed sequential process that leads to awareness. Like time, consciousness is also subjected to relativity. When the observer is moving, both time and consciousness dilate, which does not give an advantage to the moving observer to enhance the awareness over the resting observer. Further, the electromagnetic energy of consciousness follows quantum principles and wave-particle duality, which interplays with matter and energy. The rest mass of the consciousness particle increases when increasing consciousness frequency or decreasing the speed of the consciousness particle. This interplay of consciousness with matter and energy makes consciousness and reality interrelate and follows determinism, realism, and physicalism, the fundamental essences of modern physics. Further, that explains the limitations of the five senses of an observer (i.e., sight, hearing, taste, touch and smell) and the role of consciousness in understanding reality. In future, we would like to extend this model to explain dark matter and dark energy.

INTRODUCTION

Why the universe is made in a certain way is a challenging question. Many try to answer that question based on their assumptions and knowledge.

Historically many people thought the universe was made by a supernatural force that they believed was powerful. They brought the sun, planets, stars, and natural phenomena (e.g., thunder, wind, etc.) as a creator [1]. Later, some of those thoughts evolved as fundamentals of religion, and some still believe them.

Later, when studying the works of mathematicians and philosophers such as Pythagoras [2], Plato [3] and Roger Penrose [4], one may think that the nature of the universe is mathematical. Werner Heisenberg was concerned about whether the law of nature fundamentally boils down to elementary particles and forces or does it boil down to pure math, geometrical forms and numbers [5]. Eugene Wigner [6] stated that the miracle of the appropriateness of the language of mathematics for the formulation of the laws of physics is a wonderful gift which we neither understand nor deserve. In mathematics, there are fundamental axioms and assumptions which enable logically and mathematically model the realities.

Then studying the universe further, one may observe that the universe is tuned to be amazingly life-friendly. Physicists like John Barrow [7] and Frank Tipler [8] suggested that many natural constants exist throughout the universe where, had they been even slightly different, sustaining intelligent life might not be possible. Therefore, some may see biology as the fundamental law of the universe and life.

Further, physicists also suggested an intelligent design of the universe where the mind governs the laws of the universe. Max Planck [9] suggested a conscious and intelligent mind can be the matrix of all matter. James Jeans [10] stated that the universe begins to look more like a giant thought than a great machine. On the other hand, John Wheeler [11] stated underlying semantic information might be the primary for our wisdom on space, time matter, and other constructs.

The matter, energy, mathematics, biology, chemistry and many other constructs have been investigated and unified substantially related to the fundamental law of nature. In this paper, we would like to understand consciousness as a real, fundamental, underlying law of nature. Then, like space and time, consciousness can have its own intrinsic degrees of freedom for defining the law of nature.

In the modern era, philosophers believe that science and empirical investigation can discover the universe and the laws of nature. With the assumptions of

1. Determinism: The future uniquely follows from the present,
2. Realism: There exists a real-world independent of any observer, and it can be known,
3. Physicalism: Everything that exists is physical,

there is no separate realm of the supernatural, spiritual, or divine, nor is there any cosmic, teleology or transcendent purpose inherent in the nature of the universe or life. They believe consciousness does not denote essences distinct

from matter but rather an interplay of extraordinarily complex systems [12]. In our modelling, we adhere to those assumptions such that our model complements modern physics.

Our model unifies matter, energy and consciousness as a fundamental law of nature and life. It suggests that the interplay between matter, energy and consciousness could be the reason which makes the universe and life as it is. Importantly, it complements the contemporary literature and assumptions of other fields such as physics, maths, biology, etc. Our contributions are:

1. development of a model which interfaces the brain and consciousness,
2. development of a model which shows how consciousness can interact with matter and energy,
3. development of a model which complements dark matter and dark energy.

METHODS

Humans or observers physically observe the environment via five senses. Through the five senses, it is possible to observe sight, hearing, smell, taste and touch. A significant portion of brain resources is allocated to manage these senses. Based on our understanding of modern science and technology, deep neural networks in the brain manage those sensory functions. These deep neural networks perform parallel processing with low frequency. In contrast, we propose consciousness as a sequential information-processing process associated with the brain. The notion of sequential consciousness is a heuristic. We assumed irrespective of parallel processing in the brain on five senses, consciousness focuses on a single piece of information at a time. Therefore, consciousness is operating at a very high frequency which can sample and be aware of the brain information. McFadden posits that consciousness is in fact the brain's energy field [13]. Therefore, in our model, we assumed that consciousness is electromagnetic energy and behave according to wave-particle duality. We assumed that this electromagnetic energy in the brain creates consciousness, matter, energy and reality. The proposed model of interfacing the brain and consciousness is illustrated in Figure 1, where consciousness is assumed as a fundamental process of reality which interplays with

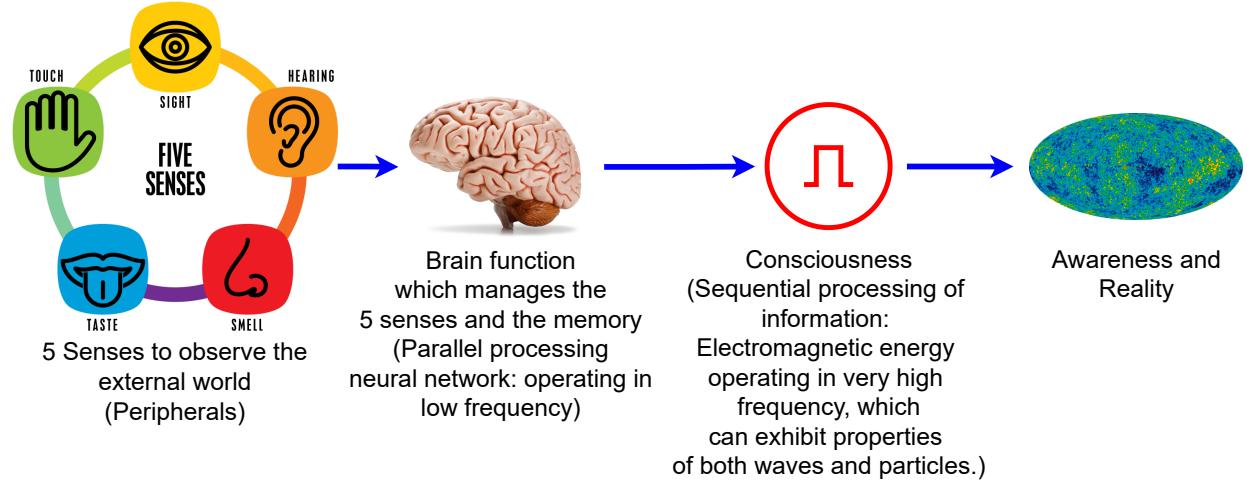


FIGURE 1: The interface between the five senses, brain and consciousness for bringing awareness. Consciousness is a sequential information-processing process that focuses on a single piece of information at a time and brings awareness. It is a form of electromagnetic energy operating at a very high frequency to cater to the demands of the slow yet massively parallel-processing brain connected with five senses to observe.

matter, energy and other constructs.

Based on Einstein's relativity equations [14], we know that the observed duration of an incident gets longer with the velocity of the observer. This is also called *time dilation* which can be expressed mathematically:

$$\Delta t = \frac{\Delta t_0}{\sqrt{1 - \frac{v^2}{c^2}}}. \quad (1)$$

Similarly, we can express the dilated period of consciousness T_v based on the rest period of consciousness T_0 :

$$T_v = \frac{T_0}{\sqrt{1 - \frac{v^2}{c^2}}}, \quad (2)$$

where the v is the velocity of the observer. We can state this as *consciousness dilation* in relativity. Further, the frequency of consciousness f_μ can be expressed:

$$f_\mu = \frac{1}{T_0} = \frac{1}{T_v \sqrt{1 - \frac{v^2}{c^2}}}, \quad (3)$$

where f_μ depends on the state of awareness of the observer. We define a cycle of consciousness as the shortest time to be aware of the change of reality by an observer. When the velocity of the observer changes, the period of consciousness T_v changes while maintaining the frequency of consciousness f_μ constant.

In our consciousness model, we assumed that consciousness behaves according to wave-particle duality as described in de Broglie hypothesis [15]. Further, we assumed that consciousness photons energy transforms into particles conserving energy and momentum. The quantum energy of consciousness is the source of the consciousness particle's rest and kinetic energies (total energy). The system consists of the consciousness photon and the consciousness particle follows the conservation of momentum. Therefore, the energy of consciousness as a wave can be expressed:

$$E_\mu = hf_\mu \quad (4)$$

while the energy of consciousness as a particle can be expressed:

$$E_\mu = \sqrt{p_\mu^2 c^2 + m_\mu^2 c^4} \quad (5)$$

with the momentum vector of consciousness particle \mathbf{p}_μ :

$$\mathbf{p}_\mu = \frac{m_\mu \mathbf{v}}{\sqrt{1 - \frac{v^2}{c^2}}} \implies p^2 = \mathbf{p}_\mu \cdot \mathbf{p}_\mu, \quad (6)$$

where m_μ is the rest mass of consciousness, h is the Planck constant, c is the velocity of electromagnetic waves, v is the speed of consciousness particle and the f_μ is the frequency of consciousness wave. Equating Eq. 4 and Eq. 5 followed by substituting Eq. 6 gives

$$hf_\mu = \sqrt{\left(\frac{m_\mu}{\sqrt{1 - \frac{v^2}{c^2}}}\right)^2 v^2 c^2 + m_\mu^2 c^4} = \frac{m_\mu}{\sqrt{1 - \frac{v^2}{c^2}}} c^2. \quad (7)$$

Eq. 7 unifies matter, energy and consciousness.

RESULTS

Based on Eq. 7, we plot the speed of consciousness particles, frequency of consciousness and rest mass of consciousness particles in Fig. 2. As per Fig. 2, the speed of consciousness particles is bounded between zero and light speed. The frequency of consciousness is bounded between zero and the range of visible light. The upper bound of the frequency is set to the visible spectrum since there are no observations of light or high-energy electromagnetic waves in brain activity. The rest mass of the consciousness particles is plotted based on those two dimensions - speed and frequency. As shown in the contours of Fig. 2, in lower frequencies of consciousness, consciousness particles have a very lighter rest mass. On the other hand, in higher frequency consciousness, consciousness particles have heavier rest mass, unless otherwise consciousness particle speed is very high.

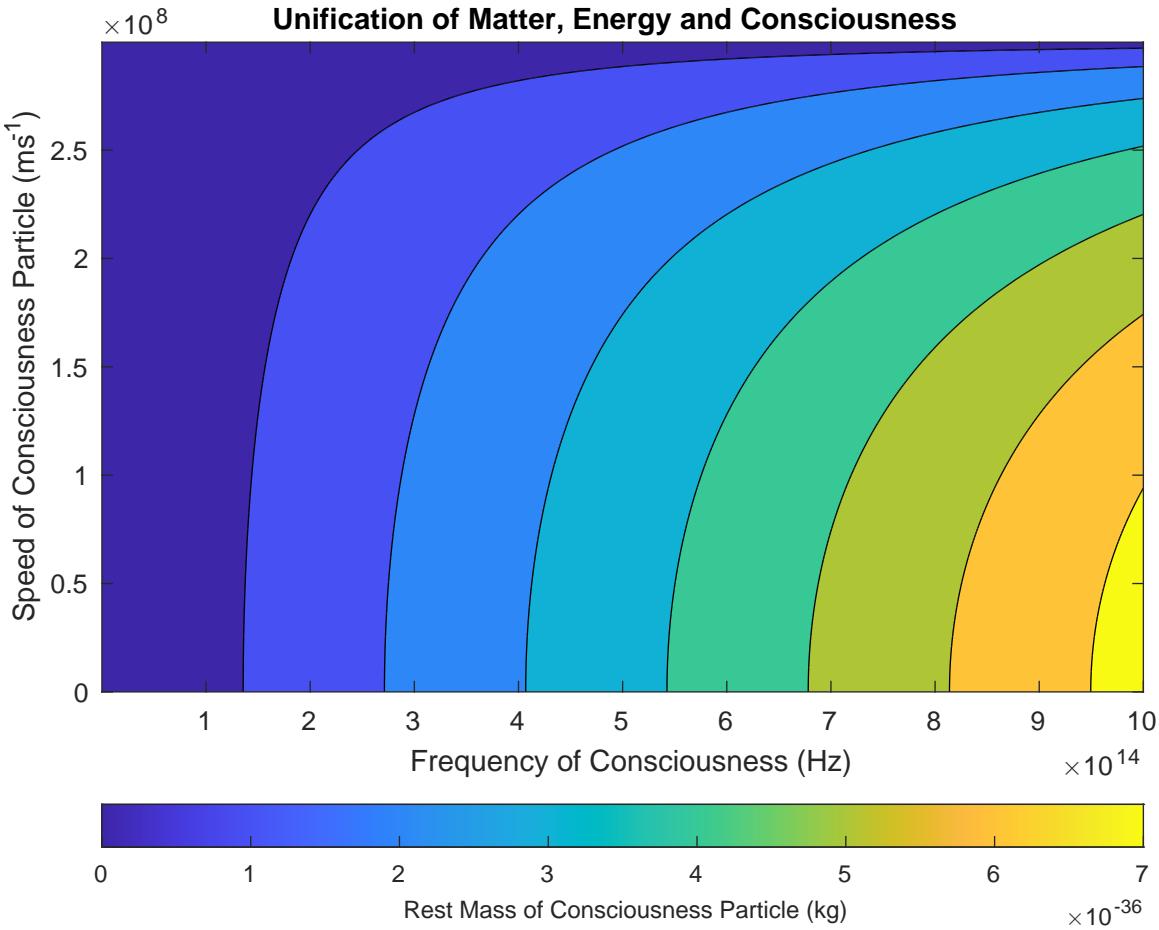


FIGURE 2: Unification of matter, energy and consciousness. Consciousness creates energy and matter, which follows wave-particle duality and the theory of relativity.

DISCUSSION

Consciousness is a sequential information-processing process that focuses on a single piece of information at a time and brings awareness. It is a form of electromagnetic energy operating at a very high frequency to cater to the demands of the slow yet massively parallel-processing brain connected with five senses to observe.

Consciousness is also subjected to relativity. When the observer is moving, both time and consciousness dilate. Therefore, shorter time observation of a moving observer related to a resting observer doesn't mean an advantage in information processing or awareness. Consciousness creates energy and matter, which follows wave-particle duality and the theory of relativity.

Based on the definition of consciousness, a cycle of consciousness is the shortest time to be aware of the change of reality. Therefore, the frequency of consciousness relates to awareness such that higher frequency means higher awareness. When consciousness frequency is decreasing (i.e., in a lower state of awareness), it creates consciousness particles having lighter rest mass. On the other hand, when consciousness frequency is increasing (i.e., in a higher state of awareness), it creates consciousness particles having heavier rest mass.

Our model suggests consciousness can create energy, matter and realities beyond our sensory observation (i.e., realism), which might help us be aware and accept the existence of dark matter, dark energy and other complex constructs.

CONCLUSIONS

In conscious reasoning, the universe is a grand design and amazingly tuned to be life-friendly. Therefore, understanding how consciousness interplays with matter and energy are essential to understanding reality. Based on the theory of relativity and quantum physics, we modelled the interplay of consciousness, matter, and energy, creating reality. This unification model of consciousness, matter and energy explains how consciousness adheres to determinism, realism, and physicalism as a fundamental law of nature and reality. It helps us to be aware and accept the existence of consciousness-based complex constructs and systems beyond our sensory observation.

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