



Visualization of Information

Daegene Song

ABSTRACT

One of the surprising and mysterious parts of nature is the form of life. Unlike other physical systems, living organisms exhibit a very peculiar property, i.e., they self-organize, reproduce, etc. Indeed, life has yielded a special aspect of which appears to be the time-reversal process of non-living physical systems in nature. Following the discussion of Schrödinger's negative entropic aspect of life, it is outlined that biological property may correspond to the classical projection from the semantics of DNA encryption, which is associated with the Dirac-type negative sea of consciousness. In particular, this analogy is similar to the dual nature of light where the photon outcomes in classical space may be considered a projection from the quantum negative sea of consciousness, or aether. Indeed, life, which exhibits the aspect of negative entropy as suggested by Schrödinger, may be considered as an *image* of consciousness.

Key Words: Information, Negative Entropy, DNA, Life

DOI Number: 10.14704/nq.2018.16.1.1131

NeuroQuantology 2018; 16(1):32-36

Introduction

Life has often been considered one of the most miraculous features in nature (Lovelock, 1979; Emmeche, 1997; Mullen, 2002; Tsokolov *et al.*, 2009). In particular, years of intense study by numerous researchers have led to the discovery of the unimaginably complex structure of life, including metabolism, reproduction, etc. Alongside great advancements in the understanding of life, confusion regarding the nature of life at the fundamental level has also increased. For instance, the very definition of what life is remains unsettled among researchers of various backgrounds ranging from molecular biology to philosophy; likewise, how life arose, if it ever did, from non-living physical systems also remains unclear (Mautner, 2000; McKay, 2014).

The fundamental aspect of life has also been examined in the field of physics. In particular, the thermodynamical aspect of life has received widespread attention, i.e., how order in life arises out of disorder common in non-living physical systems. Indeed, life seems to exhibit a

time-reversal process of other physical systems in the sense that, ordinarily, the level of disorder increases, which also indicates the direction of time. In 1944, one of the founding fathers of quantum theory, Erwin Schrödinger, published a well-known book, *What is Life?* (Schrödinger, 1944). Noting the unusual time-reversal mechanism specific to life, Schrödinger gave the following quote:

"What an organism feeds upon is negative entropy"

The question we may then ask is how this aspect of negative entropy appears with living organism. Indeed, motivated by the deeply intuitive discussion provided by Schrödinger, a number of people have attempted to further develop this idea with particular emphasis on explaining the biological mechanism with energy (Morowitz, 1968; Peacocke, 1983; Wicken, 1987; von Stockar *et al.*, 1999; Swenson, 2000; England, 2013). On the other hand, another significant aspect in the study of life is consciousness. In the same book, Schrödinger discussed the

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Received: 04 October 2017; **Accepted:** 22 December 2017



importance of consciousness, stating, for example:

Consciousness cannot be accounted for in physical terms. For consciousness is absolutely fundamental.

In this note, we will attempt to establish a relation between consciousness and negative entropy. Indeed, it will be argued that the negativity of life's entropic aspect should be considered as a visible *image* of invisible consciousness.

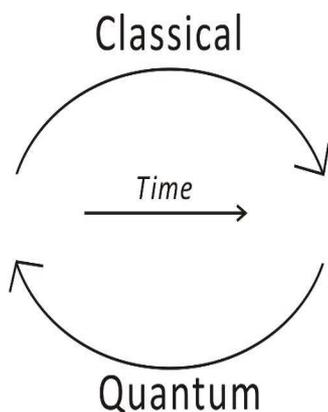


Figure 1. The initial process of the cyclical looping corresponds to the experience in classical space with time moving forward and the closing part of the loop is the quantum evolution with time going backward or Dirac-type negative sea of consciousness.

Review

Consciousness may be understood in terms of self-referencing, as in the liar's paradox (Song, 2007; 2017b). That is, self-observation in consciousness corresponds to the case in which the observer and the observed are identical. This natural phenomenon appears rather difficult to understand since observation is generally considered as the experience of relative difference between the observer's reference frame and the representation of the object. A similar difficulty arises via the example of the liar's paradox, where the contradiction, or the difficulty, arises when the meaning of the sentence refers to the sentence itself.

This difficulty may be overcome by introducing the cyclical time model. That is, by dissecting this self-observation into two parts, where the first, time-forward part describes the observation and the second, time-backward part is such that the observed object in the first part of the loop is in fact the observer. This two-step approach provides a picture of consciousness that is easier to understand.

In (Song, 2017b; 2017c), it was elaborated that the initial process of the looping is classical while the closing part is quantum (Figure 1). That is, the physical universe is imagined to be filled with the Dirac-type quantum negative sea of consciousness. In particular, it was argued that the cosmological constant problem may be understood based on this subjective approach (Song, 2017b). In the following, we will attempt to outline the negative entropic aspect of life based on this subjective model of consciousness.

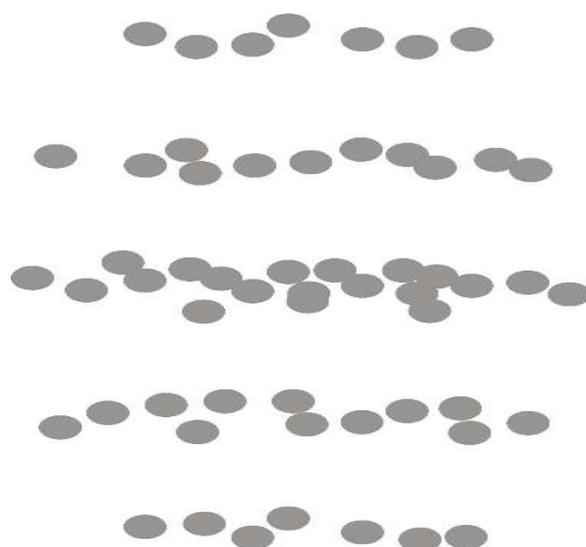


Figure 2. Image of the negative sea: The time-forward classical space is associated with photon outcomes, and the time-backward negative sea is associated with the aether. Photon hits in classical space exhibit the property of negative sea of interference pattern, as seen in Young's double-slit experiment.

Image

In the 17th century, Newton insisted that light was composed of particles based on its reflection property; around the same time, the wave property of light was being discussed by Huygens. Young's double-slit experiment is known to exhibit the strange property of light whereby as it passes through two slits, due to the wave property, interference occurs between the waves; such was the original result of the experiment. Technological advancements have enabled us to analyze this process in more detail with single photons. Amazingly, after many photons, their accumulation demonstrates the wave interference pattern (Figure 2).

While various delicate experiments have confirmed that wave and particle properties indeed exist simultaneously (Wootters *et al.*,

1979; Kim *et al.*, 2000; Jacques *et al.*, 2007; Liu *et al.*, 2009; Jia *et al.*, 2014; Coles *et al.*, 2015), it is still unclear how this is the case (Feynman, 1970). For example, the wave property of light is one of its more mysterious aspects. That is, in order to behave as a wave, one needs a medium to propagate through; yet light does not appear to be the case.

In (Song, 2017a), the wave-particle duality of light was discussed in the context of the subjective model (Figure 1). In particular, it has been argued that the hypothetical object, aether, may be real, and the reason it is not detectable could be because it corresponds to the Dirac-type negative sea of consciousness, with the negative sea being generated through the evolution of the observer's reference frame in a time-backward manner. Therefore, following the proposed subjective model, it can be seen that the wave property occurs in the observer's consciousness, while the outcome is displayed in classical space.

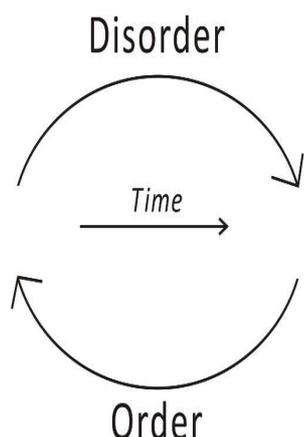


Figure 3. Physical outcomes in a time-forward manner are disorderly but become orderly through the time-backward quantum evolution, i.e., the negative sea or aether, of conscious awareness of the physical outcomes.

The interplay between order and disorder in the single-photon interference experiment may be understood as follows: When each photon hits the screen, its location in classical space appears random and disorderly. The order out of disorder arises through the Dirac-type negative sea of consciousness, which provides a conscious awareness or realization that these apparently random hits are generating the wave interference pattern. Therefore, it may be said that the random outcome of photon hits in classical space becomes an ordered image through conscious realization (Figure 3).

DNA

Schrödinger's 1944 discussion of life included the notion that genes may carry codes. This idea sparked a number of important studies, culminating with the discovery of the double-helix structure of DNA by Watson and Crick (Watson *et al.*, 1953) based on Franklin's experimental data. DNA has four encrypted letters—A, T, C, and G—that convey genetic information (Cristianini *et al.*, 2006). In order to discuss the negative entropic nature of life, we wish to consider DNA as a specific type of language. In a sense, decoding information in DNA may be understood as genetic semantics of language.

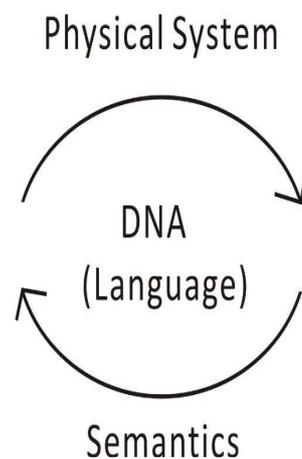


Figure 4. Following the looping process, DNA may be considered as a language connecting two parts of the loop. The initial time-forward process corresponds to the physical system, while the second part of the loop is conscious awareness of the DNA information, i.e., the semantics of DNA. Similar to Young's experiment, the physical system exhibits the image of the conscious semantics.

The analysis of language is one of the central themes in many studies and fields, including philosophy. Following the pioneering work by Frege on mathematical logic, Wittgenstein attempted (Wittgenstein, 1922) to explicate the close link between language and physical reality, arguing that, unlike ordinary thought, when a physical system is given a name, it is not just a label. In fact, it is the semantic meaning associated with the name that is interconnected with the physical reality. In particular, it was argued that similar to cyclical time, the role of language is to connect these two processes.

The link between language and reality may be applied to analyze the negativity of life by adopting the cyclical time model of the subjective approach. The initial process corresponds to the

classical irreversible process generating randomness, while the closing part of the loop corresponds to the negative sea resulting from time-backward quantum evolution or nondeterministic computation (Figure 4). That is, order is established through the conscious awareness or realization of physical randomness in the initial part of the loop, similar to the case of Young's experiment where the random outcome of each photon in physical space establishes an order of the wave property in the negative sea. Inseparability is exhibited through the classical physical system that has the property of negative entropy—namely, living organisms. That is, the image of the negative sea ought to be the living biological process that yields the negative entropic aspect.

Remarks

Infinity and finiteness may be the aspects distinguishing between classical and quantum, or physical and mental. That is, what can be observed or transferred in classical space is finite while mental understanding of the meaning of finiteness could involve infinity. It was noted earlier (Song, 2017c) that it is unusual to communicate the meaning associated with infinity or continuity with only a finite number of bits. In (Song, 2014; 2016), it was discussed that inside the black hole horizon with singularity should correspond to the mental or consciousness outside the horizon which is associated with continuity or infinity.

Science may be considered an analytic approach based on subjective experience or observation. The subjective model discussed in (Song, 2017b; 2017c) suggests that the finite physical world is filled with the infinite observer's conscious reference frame, which may also be considered as a Dirac-type negative sea or aether. In this paper, we have discussed that, similar to the physical photons exhibiting the property of the negative sea, or the aether, life may be considered as an image of consciousness, or the negative sea. That is, order from disordered eigenvalue outcomes is established through consciousness. It was also noted that the proposed cyclical time model that interlocks physical reality and consciousness is similar to Heidegger's existentialism argument (Heidegger, 1962), particularly being's temporal nature with the past, present, and future. This concept of time is in fact opposite to the usual linear time model where a physical system exists only at the present

time (also see (Bergson, 1913) for a similar discussion).

The dual aspect of order and disorder discussed in this paper is also exhibited in the case of free will. In fact, one of the peculiar aspects of free will is that there seems to be two opposite sides depending on one's perspective. That is, on the outside, the choice should be random; yet from the inside, one should be able to choose freely. The subjective picture (Figure 3) illustrates that the choice which appears physically in a time-forward manner is disorderly; yet internally, i.e., the closing part of the loop where time goes backward, the conscious awareness of the physical choice establishes order. The dual aspect of free will has also been discussed in terms of black hole entropy (Song, 2014).

Acknowledgment

This work was supported by the research grant of the Chungbuk National University in 2016.

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