What is Consciousness?

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ABSTRACT

Consciousness is the product of the Singularity/Big Bang, along with everything else in the Cosmos. Understanding the origin of consciousness as the Consciousness of the Singularity/Big Bang requires that it must be seen diachronically across space-time. Consciousness is the software component of Cosmology as the Data Operating System. We can transcend consciousness and approach Consciousness by authoring our own software once we recognize this fundamental mechanistic interrelationship.

Key Words: consciousness, singularity/big bang, software, data operating system, auto-engineer

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Introduction

Conventionally, consciousness is defined as the state of being aware of one's existence, sensations, thoughts and surroundings. The following is a radical departure from that, which is based on a teleological way of thinking about consciousness functionally (Roux, 2014). In her article "Is Matter Conscious" Morch (2017) relates that the 'mystery' of consciousness lies in whatever process determines the structure of matter, and that for that reason, matter has consciousness. I think Morch, like literally everyone else delving into this subject, is misdirected by a descriptive, synchronic approach to consciousness. The Singularity/Big Bang was hypothesized to have been the origin of the Cosmos (Kurki-Suonio, 2018). The central problem is that consciousness is the vectoral product of the Singularity/Big Bang (Torday, 2018), along with everything else in the Cosmos. But the problem with consciousness in particular is that it is actually the animation of the Singularity/Big Bang; as Schopenhauer had said in response to Kant's definition of matter- we understand matter because we are it (Schopenhauer, 2018). But in order to truly understand the intimate relationship between consciousness and matter you must approach it from a diachronic perspective for evolution theory, as follows.

Evolution, from the Beginning

Unicellular organisms biologically dominated the earth for the first 3.5 billion years (Woese, 1987). It has been hypothesized that life emerged on earth as a product of the lipids present in the snowball-like asteroids that pelleted the earth prior to the formation of the oxidative atmosphere to form the oceans (Deamer, 2017). When lipids are immersed in water they spontaneously form primitive 'cells', or micelles (Moroi, 2013). Within these structures, defined by their semi-permeable lipid membranes, life began as negative entropy, sustained by chemiosmosis, controlled by homeostasis (Cannon, 1963). Lynn Sagan had hypothesized that cells evolved through the process of endosymbiosis (Sagan, 1967), internalizing factors in the environment that would otherwise have destroyed them, such as heavy metals (iron, zinc), ions (sodium, potassium), gases (oxygen, nitrogen), and bacteria. In the aggregate, the compartmentalizing of these environmental threats within the cell, making them useful is what we refer to as physiology (Margulis and Bermudes, 1985).

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Over time, prokaryotic bacteria devised pseudo-muticellular forms like biofilm (Ghannoum *et al*., 2015) and Quorum Sensing (Winans and Bassler, 2008), threatening the existence of unicellular eukaryotes, which have a true nucleus. In response, eukaryotes devised cell-cell communications, which ultimately gave rise to multicellular organisms, the communications evolving into the homeostatic regulatory mechanisms that characterize metazoans (Torday and Rehan, 2012). At the level of the organism, such homeostatic regulatory mechanisms are referred to as allostasis (McEwen, 1998). Allostasis, in turn, can be thought of as interoception, i.e. being conscious of our internal organs, which is what we ultimately think of as consciousness (Damasio, 2010). Thought of in this way, consciousness has evolved directly from the environment, being assimilated to form physiologic traits. And because those traits are founded on Natural Laws, consciousness is the 'organification' of the physical environment.

Another way to think of consciousness metaphorically is as a Data Operating System, founded on the Singularity/Big Bang, homeostasis originating from the 'equal and opposite reaction' due to Newton's Third Law of motion, which generated matter from energy. Upon being endogenized, those environmental factors that were internalized were assimilated as proxies for the Laws of Nature. Therefore, the internal and external environments both ascribe to the same set of natural principles, like computer software and hardware. This is why hominins comply with the prevailing Laws of Nature.

Why We See 'Red' When We Are in Pain?

David Chalmers has posed the 'hard question' (1995), why we see red when we injure ourselves. It is not intuitively obvious why this should be the case, but seen from the perspective described above, consciousness must integrate the individual with the Cosmos itself in order to sustain homeostasis in sync with the First Principles of Physiology (Torday, 2009). In order to accomplish that, the organism must remember its origins, all the way back to the Singularity/Big Bang. It does so through the cell-cell communication mechanisms that facilitated evolution, culminating in homeostasis as the mechanism for both sustaining and also for re-establishing homeostasis (Torday, 2015a) when the system is injured or stressed, mediating the process of evolution (Torday and Rehan, 2012). That is to say, when homeostasis is disrupted the cellular signaling partners will re-engineer themselves until they have re-established homeostasis, or die and/or become extinct. Over the course of development, such mechanisms are informed by epigenetic inheritance of 'marks' in the environment that are found to pose an existential threat, the former being determined by meiosis, mitosis and ultimately by homeostasis.

Re-Establishment of Cellular-Homeostasis

Once the offspring is autonomous, the same homeostatic monitoring system directs the cellular partners to remodel in order to re-establish homeostasis either for injury/repair, epigenetic adaptation, or evolutionary adaptation (Torday, 2015a) as a function of the time-frame. Under acute circumstances the cells will re-establish homeostasis by scarring; on a longer-term basis between generations, the signaling cells will remodel the structure-function developmentally (Demayo *et al*., 2002); and on a phylogenetic scale, the cells will re-engineer themselves due to environmental stress, internal physiologic stress generating Radical Oxygen Species due to shearing of the walls of the microvessels, causing gene mutations and duplications (Storr *et al*., 2013) that further promote re-engineering of the structure-function relationships to re-establish homeostasis, giving rise to new species (Torday and Rehan, 2017).

Over the course of such re-engineering, the nervous system, which has evolved to monitor homeostasis, must also re-establish its capacity to monitor the tissue, undergoing changes in structure-function (Madadi *et al*., 2018). That [illegible]tical integration of structure-function and neuro[illegible] monitoring are the basis for associating pain with seeing red as a comprehensive perception of properties of the organizational physiologic hierarchy, as follows.

Recapitulation of the Evolutionary Principle of Cell-Cell Communication

The Hard Problem, No More.....

Given the cellular re-engineering of tissues, there must also be mechanisms for recapitulating allostasis at the organismal level. Such processes emanate from the neuroendocrine hormones that have evolved for this role, acting to integrate the structure and function of tissues at the organismal level. The classic example is the way in which endothermy evolved from the *ad hoc* relief of hypoxia caused by the step-wise process of cell-cell interactions for lung evolution (Torday, 2015b), the diameter of the alveoli

becoming smaller and smaller in order to increase the surface area-to-blood-volume ratio (Clements *et al*., 1970). Briefly, Hypoxia stimulated the Pituitary-Adrenal Axis, increasing the production of adrenaline by the adrenal cortex (Wong, 2003). The stimulation of adrenaline acutely alleviated the constraint of the alveoli for gas exchange by stimulating surfactant production (Lawson *et al*., 1978), allowing the alveoli to further expand; that effect acutely increases gas exchange and alleviates the hypoxia. In the longer-term, Parathyroid Hormone-related Protein production by the alveolar type II cells is increased by the distension of the alveoli (Sanchez-Esteban *et al*., 1998), enhancing alveolar formation (Rubin *et al*., 1994). Ultimately, the ad hoc stress mechanism for increased oxygenation was superseded by the production of oxytocin by the Hypothalamus, acting to control body temperature constitutively (Sato *et al*., 2013). Oxytocin also determines physiologic interactions between the cone photoreceptors for color vision and the retinal photoreceptor epithelium (Halbach *et al*., 2015), which may be why we associate 'red' with physical pain, such as the hypoxial pain of long-distance running.

The Integration of Consciousness and the Ecosystem as Disembodied Mind

Another looming question in the realm of Consciousness that is instructive is Andy Clark's 'disembodied consciousness' (Clark and Chalmers, 1998). He uses an example of taking notes as a way to 'extend' consciousness into the environment, which is not unlike the burgeoning concept of Niche Construction as a way 'extending' the internal physiologic environment out into the surroundings as a way for the organism to gain more control over its domain (Laland *et al*., 2014).

Hisorically, Darwin was actually the first to observe this phenomenon, noting that earthworms are able to retain their aquatic kidneys on land by manipulating the soil around them (Darwin, 1881). That practice is like beavers building dams, or hominins building villages, cities, and Nation States. That concept has now been merged with the unicell as the means of evolving, hypothesizing that it was the first Niche Construction, extrapolating from Endosymbiosis to Niche Construction, the combination effectively unifying evolutionary biology and ecology as one integrated process (Torday, 2016). And when seen from the perspective of consciousness as the internalization of the Cosmos, it links the unicell to Cosmology as a holistic effort for mind and matter as a unity (Morch, 2017).

This way of thinking about the relationship of biology to physics runs counter to the way we currently think of the hominin condition, somewhere along a line of identity between the ambiguity of our origins and coping through deception.

Science is the only tool we have for extricating ourselves from this condition, formed by reasoning after the fact about our origins and trajectory as 'Just So Stories' (Kipling, 1978). On the other hand, David Bohm has explained that this situation has come about due to our highly evolved senses filtering our perception of the Explicate Order in order to survive (Bohm, 2002), but that there is an Implicate Order just over the horizon that is obtainable by the scientific method. That is the premise for the cellular approach to evolution based on embryologic mechanisms of cell-cell communication, providing a way of understanding structure and function systematically (Torday and Rehan, 2012). By tracing such cellular communications back in space and time, the how and why of lung evolution has been elucidated, for example (Torday and Rehan, 2007). Turning the process of development for form and function around 180 degrees has made otherwise dogmatic concepts transparent, ranging from evolution itself (Torday and Rehan, 2012), to the cell (Torday, 2015a), heterochrony (Torday, 2016b), the life cycle (Torday, 2016c), phenotype (Torday and Miller, 2016a), terminal addition (Torday and Miller, 2018) and homeostasis (Torday, 2015a).

Human Consciousness, A Case Study in Cell-Cell Communication

Human consciousness is widely considered to be the epitome of consciousness, given what we can do intellectually compared with other species. The reason for this seeming superiority is revealed by the reduction of warm-bloodedness (Torday, 2015a). Hominins have evolved the ability to walking on their hind legs (Marino, 2008). That tra[illegible]ould not have been possible in cold-blooded organisms because of the inefficiency of their metabolism, requiring multiple isoforms of the same enzyme in order to function optimally at different ambient temperatures. In contrast, mammals only require one form of any given metabolic enzyme, rendering their metabolism far more efficient. Which facilitated bipedalism, which requires more energy than walking on all fours (Rodman and McHenry, 1980). Importantly,

walking on our hind legs freed our forelimbs for specialized functions such as tool making and texting. In turn, such highly evolved traits required a more complex peripheral and central nervous system to accommodate such newly-acquired functions. And the combined effects of increased mobility and a more elaborate nervous system facilitated interfacing with the environment and the collection of epigenetic marks, given hominins have adapted to not only the four corners of the earth, but even to deep space. And the interplay of endothermy, locomotion and epigenetics fosters ever-more complex consciousness in hominins.

Is the Mind 'Software'

The case is being made for consciousness to be derivative of Consciousness as the way we intuit the Cosmos and the Laws of Nature. As such it is analogous with computer components, Consciousness being the Data Operating System (DOS), consciousness being the software. As such, the software does not know that it is functioning under the aegis of the DOS, only perhaps that there is something greater than itself. Similarly, we are not actively aware of our relationship to the Cosmos, but we also sense that there is something greater than ourselves. But if we were made aware of that interrelationship, perhaps we could program ourselves to function on a higher plane. That is what David Bohm is suggesting in "Wholeness and the Implicate Order" (Bohm, 1982). That is unlike Raymond Kurzweil's vision of the Singularity of technology (2005), gadgets assisting us in the Explicate Order, perpetuating the synchronic view of existence, whereas self-engineering our software to transcend the Explicate and move closer and closer to the Implicate Order is a quantum leap.

A Cartesian Coordinate Approach to Consciousness

It has been proposed that 'life is simple' (Torday, 2016c), but that we complicate it because we exist between ambiguity and deception (Torday and Miller, 2017), so we cope by making up "Just So Stories" (Kipling, 1978). This insight has largely derived from combining cell-cell communication as the mechanism of evolution (Torday and Rehan, 2012) with epigenetic inheritance, the latter leading to the realization that the zygote is the primary level of selection. That perspective is like the one expressed by the Red Queen in "Alice in Wonderland" running as fast as she can to stay in place (Torday, 2018). We too are doing that in service to the First

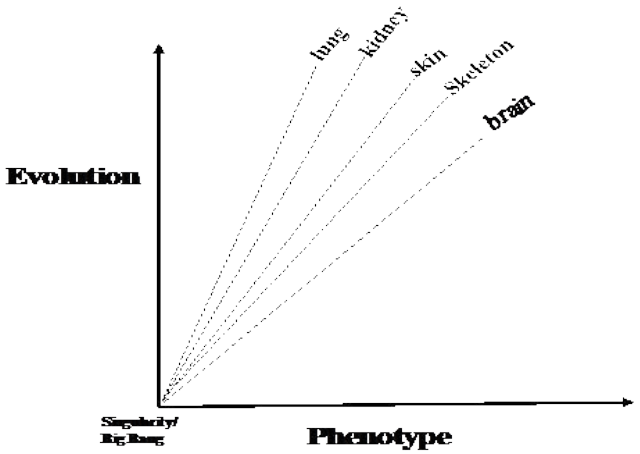

Figure 1. Regression of Phenotypic Evolution. Cell-Cell interactions mediate the 'evolution of metazoan organs, originating with the Singularity/Big Bang

Principles of Physiology, which ultimately reference the Singularity (Torday, 2018). The complexities of biology as Darwin's Tangled Bank metaphor (Darwin, 1859) are epiphenomena of the Phenotype as Agent (Torday and Miller, 2016a), the Rube Goldberg frills and flourishes acting to optimize the adult organism's capacity to collect data from the on-coming environment. This diachronic, across space-time perspective leads to the realization that time is an anthropomorphization (Canales, 2016), leaving the dimension of space as the default mode (Rowlands, 2016). And space can be reduced to a point-source (Torday and Miller, 2016b) without time. By reverse-engineering specific phenotypic traits like the lung, kidney, skin and brain (see Fig. 1) from their present forms to the unicell, their paths project back to the origin of the Cartesian Coordinates, or zero. That null condition approximates the Singularity/Big Bang. As such, deeper investigation of the properties of the unicell will hypothetically provide further insights by facilitating the predicted transition from the Explicate to the Implicate Order (Bohm, 2002). In doing so would provide greater insight to such concepts in physics as Quantum Mechanics, String Theory, and the Higgs Boson, expanding our consciousness further and further towards our knowledge of Consciousness as the Singularity.

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