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From the Non-Living to the Death

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Abstract: This paper posits that life and death are two sides of one and the same process. Rather than considering states, we must adopt a process-oriented perspective. This article presents three speculative arguments. The first hypothesis suggests that existence is the strategy by which the universe manifests itself, and that the first tactic for activating this strategy is the simultaneity between life and non-life. The second hypothesis posits that consciousness is a stance of the living experience. The third hypothesis asserts that we are simultaneously alive and dead, but that we remain more time alive than dead. This is why we have the impression that we are alive. The paper is hence written in the first person. Speculation is a valid heuristic when there is no sufficient information available or when thinking ventures in a domain where the state-of-the-art is scarce.

Keywords: Heuristics; Consciousness; Life and Death; Universe; Reality

1. Introduction

Living conscious beings, as we are, are also conscious of our inevitable death. Our action field frame is found only inside this interval between our living and dead space-time conscious manifestation. Prior to birth and subsequent to death, there is no distinction in our consciousness, as we know it. However, questions arise in our conscious life: is our existence irreversible? What we mean is that once we are born, shall we exist forever? Once we are born as complex and functional individuals, we exist as alive beings. However, when we die, we continue to exist, however under another form, which we call "died." Our existence should be correlated only to our presence as functional individuals. Alternatively, we might consider conjugating the verb to exist in the past tense for deceased individuals.

In this brief reflection on the fundamental and universal questions we have posed, we propose some speculations about the trajectory between the non-living and death, informed by considerations drawn from physics and biology.

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Our speculations present contradictions in the sense of modal logic, which have not been thoroughly treated in this paper. We prefer to begin by mentioning a general statement (which we could call speculation zero) that serves as the foundation for all the speculative studies included here.

Let us proceed from the simpler to the more complex. The first intuitive idea that arises in our minds could be expressed as an interrogation: namely, the non-existence could or should be related to the death? Our hypothesis is that in order to be dead, one must first be alive. However, once one is dead, one still exists in a state of being dead. Consequently, the only possible category is to be either alive or dead. Therefore, when we can say "to be" in French, "*être*," or in Spanish, "*ser*," (in sharp contrast with, say, what happens in English or in German) it seems that the existence becomes a category of the universe as a sort of space-time expression.

The following statement provides the foundation for the subsequent speculative study:

The existence is a strategy by which the universe manifests itself. The "living and non-living" are merely tactics of the same universe, namely the universe we find ourselves in.

A book could be written around this speculation, but for the purposes of this paper, we will simply state and then unravel the speculation.

The following section presents three related speculations. The first one postulates that existence is a strategy of the universe, with life and non-life coexisting "simultaneously." The second suggests that consciousness pervades life from one extreme to the other. Finally, the third speculation asserts that we are simultaneously alive and dead, yet experience life rather than death for practical reasons.

It is therefore worth noting that a speculation is a valid heuristic in the following circumstances: a) when there is no sufficient information, and b) when brand-new ideas emerge that serve as a key to opening up new avenues of enquiry.

2. Speculations

Speculation 1: Is the non-living dead? This question seems trivial and redundant, but within our common language, if we talk about something as being dead, we can wonder what it was when it was alive. It is not the case of a stone that we consider as something that was always non-living. We may ask ourselves what it was (the stone) when it was alive. This is not the case, but we do wonder about its origin and what form it had in its past. We may ask about the past of a rock because we consider that it has a past, that is to say which, over time changes occurred. Thus, we assume that a rock undergoes physicochemical reactions, variations in temperature, humidity, volcanic effects, aero- and hydro-dynamic effects. These effects shape the stones, modifying their integrity by spreading part of them, transporting fragments of the rock (such as sand) and leaving some fractions either in their vicinity or in more distant locations due to winds and other dynamic phenomena of geological and atmospheric terrestrial life.

We propose that the term "life," with a lowercase "l," be employed initially to designate the temporary modifications of a substance that we have designated "non-life" here. This "Life," designated "L," refers to the Life forms that are self-maintained, self-sustaining, and evolutionary. The concept of Life is so fundamental that it is challenging to define. There is no consensus within the scientific community regarding the definition of Life. It is almost an axiom. One of the most complex characteristics of living beings is not only their ability to convert something alive into death, but also, even though the exact process is not known, their ability to convert non-life into life, such as the effect of reproduction.

The objective of this paper is to describe what we perceive as life and Life itself, as well as to examine the nature of our experiences.

A question arises: may we use the word "Life" without knowing what it is? We are aware of the fact of being alive, but we do not appear to have been taught in detail how to stay alive. A fundamental learning in childhood taught us how to adapt to the ways of surviving of others, and gradually to develop our own way in accordance with our innate personality. By "innate" is meant something already recorded in our biology, commonly assimilated to genetics. We typically possess an intuitive understanding that we are in control of something and that this effect makes us feel alive, or capable of maintaining continuity over time, stability, without major changes, and keeping the homeostasis.

According to the speculation we call zero, speculation 1 could be considered to be tangentially visiting the very dangerous axiomatic field. More precisely, we need to state what is first, existence or life? Was first the egg or the chicken? If existence is the initial phenomenon, it is necessary to determine who or what determines this existence. Similarly, if life is the initial phenomenon, it is necessary to determine why non-living things exist.

Physicists have devoted a great deal of time to the study of simultaneity. If we consider the problem from the perspective of a simultaneous solution, this could be a satisfactory intellectual answer. This solution would posit that existence-life and existence-non-life are simultaneous processes. Would this be the true strategy of the universe concerning existence-life and existence-non-life?

In microphysics, the vacuum is considered a permanent virtual simultaneous creation and destruction of particle and antiparticle. This suggests that simultaneity can be conceived scientifically.

However, by boldly making the analogy, the speculation we are presenting becomes challenging to set up. The existence of living things, including our own, would appear simultaneously with our life and disappear simultaneously with our death. We need to go beyond our current ideas. As previously stated, the cessation of life does not signify the end of existence. Non-living entities continue to persist, and therefore, the termination of life does not mark the conclusion of existence.

Therefore, the existence of the universe cannot be considered complete until all non-living entities that cannot die, disappear or become non-existent have been accounted for. While this ontology can be extrapolated to great lengths, we have chosen to limit our discussion here and proceed to our second hypothesis.

The first hypothesis can be summarized as follows:

The existence of the universe is a strategy employed by the universe itself, and the first tactic for activating this strategy is simultaneity. Namely, existence-life, existence-non-life.

Speculation 2: Non-living activity, no autonomy, no consciousness.

Between no-life and death: we are conscious, we are alive, we are aware of the space-time, we exist as a living entity.

We are identifying with our own arms, legs, eyes, with each living body in priority and with society and what surrounds us in second instance. Our life bears with stability in the shape and stability in feelings, of my body.

We are systems out of equilibrium; that is, to remain active and alive, we require energy to be supplied into our organism so that we dissipate immediately in a programmed and, in the best of cases, optimized manner. Many people believe that when we die, we reach an equilibrium state because we no longer require energy. We can no longer metabolize or breathe, nor do we have consciousness or the capacity to generate new cells, for instance, or to initiate movement. However, once we are dead, we have no autonomy to direct the chemical reactions that will persist until the final disintegration. Those who are alive possess a quality that specialists have termed teleonomy, (J. Monod) which signifies a permanent objective to maintain homeostasis. This entails the proper functioning of the metabolism and all the functions that keep us alive. To be alive in a stable state but out of equilibrium implies that all thermodynamic and mechanical functions are self-maintained. It appears that when these two equilibrium states are not reached, we are dead.

From a thermodynamic and mechanical perspective, death can be defined as the cessation of chemical reactions within the body. These reactions, which are essential for maintaining life, become disorganized under these conditions, leading to the natural degradation of cellular compounds (catabolism).

In essence, the body progressively breaks down without any anabolic function operating (biosynthesis of cellular compounds). This raises the question of whether the anabolic function is solely responsible for maintaining life. It is not possible to provide a definitive answer to this question. However, it is commonly assumed that anabolism is maintained at a constant temperature of 37 °C by blood circulation and active exchange with the external medium, which is in turn maintained by the active heart. This process is essential for life. However, if the brain is uncoordinated with the rest of the organism, autonomy cannot be guaranteed. It is therefore clear that the entire organism must be coordinated, as a whole, in order to function as an organic unity.

The question then arises as to whether the coordination is sufficient to maintain consciousness and awareness. It is difficult to say because when we sleep or when we are anaesthetized, we are alive but somehow unconscious. This suggests that consciousness is not a necessary condition for being alive. Being alive and being conscious of our living condition cannot be necessarily integrated in the definition of Life. Therefore, awareness is not often considered as a biological activity. We can be alive but autonomy seems to be independent of our selves.

The field of study is vast and encompasses the influence of the will upon our biological functioning. It is unclear whether the will and consciousness are intermingled. It is challenging to identify if a conscious thought is not triggered by the will.

It can be argued that to be alive is sufficient for hosting what is called consciousness. Other species, such as insects, plants, fungi and so on, are considered alive, therefore they should host something equivalent to consciousness. Our interpretation suggests that there is a specific autonomy. The loss of autonomy, chemical non-stop degradation or decomposition, something irreversible, increasing of local entropy (without decreasing entropy in their neighborhood?), flux of entropy seems to be stopped. Some living entities become fossil, namely inorganic chemical compounds. That process is very long compared to human living time. The question of whether the fate of the living is to become a non-living entity is a fascinating one. While the duration of our lives is finite, the potential for us to become non-living entities is infinite.

This speculation was related to the consciousness of being alive and to the autonomy implied in the process of becoming a living entity. The trajectory between no-living and dead explores several processes, including life, consciousness, material condition, and immaterial experiences. When we die, the journey is upon death, the journey of life is said to end. However, when does it truly begin? The precise moment of life's commencement remains uncertain. The biological process of life is

believed to commence at the earliest stages of fertilization. Nevertheless, the question of consciousness remains unanswered. In this context, we refrain from delving deeper into this matter, despite the existence of a theoretical framework. We will, however, conclude this speculation by stating that:

Life and consciousness are linked, yet they are not identical. Life is defined by the material components that sustain it, whereas consciousness is a non-material phenomenon that emerges from living processes.

Speculation 3: We are simultaneously alive and dead, yet we remain more alive than dead. This is the reason we experience the sensation of being alive. We are two sides of the same coin, analogous to action and reaction. In every process, we are Janus.

When we are dying, the steady state is destroyed after a period of relaxation (such as agony), because the non-equilibrium condition, which is a competition between processes of construction and destruction of active, living microstructures, reaches a transition toward another unstable phase. The time alive is defined as the period during which metabolism and homeostasis have been sufficiently prevalent to prevent the interruption of metabolic (anabolic) functions by apoptosis and catabolic functions. However, these functions do become prevalent.

We are programmed to remain alive, but also to die. We believe that life as a coordinated activity of metabolism, brain activity, autonomy and homeostasis have to have a threshold. Different organs have already formed, blood flow, tissue production and protein destruction prevail over apoptosis and programmed death. With regard to the threshold, it is possible to draw an analogy with the study of percolation in petroleum engineering. Porous media underground contain oil and dissolved gas that has been trapped at high pressures. When the first drill is operated from the well, oil emerges while gas is produced inside the rock by a process called depletion. Gas then migrates through the porous of the rocks toward the exterior until a connecting way allows the gas to undergo the external pressure outside the well, which is the atmospheric pressure. When gas finds a percolation trajectory from the internal to the external environment, both external and internal pressures tend to equilibrate, and the internal pressure becomes insufficient for expelling the oil outside the well. Consequently, the production of oil by depletion is halted. Thus, percolation implies a continuous trajectory, which allows for the establishment of communication between two environments. Our hypothesis is that when life is forming, the infant will be alive when a percolation trajectory is established within the body, allowing for the transmission of messages from the brain to the entire body. Consequently, all organs, including the brain and blood flow, establish a coordinated exchange with the external medium in order to initiate the autonomous process that leads to the entity's ability to maintain its own life. This situation is not reached solely at the moment of birth; rather, it is believed to occur prior to this event. This is because numerous resilience tests must be performed in order to ascertain that the infant is adequately prepared to face the challenges of the external world. The coordination of all organ activities allows for communication with the external environment, which is connected through the mother's body.

It is hypothesized that the percolation process is permanently destroyed and re-established throughout the whole life from the infant life. However, a kind of vital inertia exists that makes it necessary for there to be a kind of vital relaxation time before the vital activity is interrupted in an irreversible way. The organism detects anomalies and attempts to solve these problems using other percolation paths when it feels that death is imminent.

In our hypothesis, before the re-establishment of homeostasis is triggered, there is a brief period when communication is lost. However, the vital inertia allows sufficient time for the organism to react and re-establish or redirect the percolation path, thus preventing the organism from entering a state of

irreversible death. The organism is truly dead for a very short period, but remains alive for the majority of the time. The analogy with the electrical alternating current is pertinent. The time spent in a state of current is significantly longer than the time spent in a state without current. This results in the sensation of always being in a state of current. The analogy can be further developed by considering that it is necessary to expend 100 watts to maintain homeostasis in humans.

This power is produced throughout the body, but it must be distributed in order to provide each tissue with the necessary energy to survive and exchange information. When this process is interrupted, the result is death. This occurs when the percolation is definitively interrupted, namely when the dead time becomes longer than the living time.

When we express the idea that someone is "alive and dead at the same time," we are suggesting that the true essence of life is not being alive but rather the act of fighting to remain alive.

3 Conclusion

Speculation is a most valid heuristics when there is the possibility of pushing back the frontiers of knowledge in conditions when data are not available or sufficient. Reflection is about freedom and – voilà a scandal for positivists of all manners, does not need of contrast or experimentation.

Speculations about non-living and death in nature have allowed us to set up the problem of living things and living beings in a new way. The three speculations presented here are only a first reflection on physical and biological explanations of the dynamics of living and non-living conditions in nature. Regarding the trajectory followed by the three speculations, we feel that we can conclude by boldly answering William Shakespeare's famous question in Hamlet:

"To be OR not to be? that is the question", supplemented by our proposal in this paper, which leads to: "To be AND not to be: that is the answer".

Authors Contribution:

Mauricio Hoyos: Formal analysis. Writing final draft

Carlos Eduardo Maldonado: Conceptualization. Writing final draft

References

Kauffman, S., Patra, S. (2024). Cosmos, Mind and Life: Is Mind in Spacetime?

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4818762

Kauffman, S., Roli, A., (2023). What is Consciousness? Artificial intelligence, real intelligence, mind and quale., *Biological Journal of the Linnean Society*, vol. 139, pp. 530-538.

Meskus, M., & Tikka, E. (2024). Speculative approaches in social science and design research: Methodological implications of working in 'the gap' of uncertainty. *Qualitative Research*, 24(2), 209-228. <https://doi.org/10.1177/14687941221129808>

Prigogine, I, Nicolis Fluctuations in Nonequilibrium Systems, *Proc. Nat. Acad. Sci. USA*, vol.68, N°9, pp. 2102-2107, September 1971

Vishmidt, M., (2023). *Speculation*. Cambridge, MA: The MIT Press

Web Pages:

Haghnejae Azar, K. (2024). The Challenge of Distinguishing Living From Non-Living Entities, available at:

<https://www.researchgate.net/publication/379872790> THE CHALLENGE OF DISTINGUISHING LIVING FROM NON-LIVING ENTITIES

<https://elifesciences.org/inside-elif/e3e52a93/elif-latest-including-ideas-and-speculation-in-elif-papers>

<https://wssa.net/wp-content/uploads/Speculation-in-Scientific-Writing.pdf>

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=The+Challenge+of+Distinguishing+Living+From+non-Living+Entities&btnG=

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