Frankenstein's Spark and the STOEM Complexity Force: A Mathematical Framework for a Simultaneous Origin of Life

Preprint · June 2023

DOI: 10.13140/RG.2.2.26438.24647

CITATIONS
0

1 author:

Douglas C Youvan

259 PUBLICATIONS **5,539** CITATIONS

SEE PROFILE

Frankenstein's Spark and the STOEM Complexity Force: A Mathematical Framework for a Simultaneous Origin of Life

Douglas C. Youvan

doug@youvan.com

June 10, 2023

This paper presents a novel perspective on the origin of life, bridging metaphysical, biblical, and scientific narratives within a unified mathematical framework. The Spiritual Theory of Everything Model (STOEM) is explored, in which the universe is modeled through fractals, variables, and a Complexity Force. An innovative hypothesis is proposed: the simultaneous origin of all life on Earth, akin to a divine act, representing a departure from traditional evolutionary and abiogenesis theories. The state of life's existence is modeled mathematically as a step function, undergoing an infinite rate of change via the Dirac Delta function, coinciding with a spike in the Complexity Force. This framework offers a platform for fascinating dialogues and explorations into life's origin.

Keywords: Origin of Life, STOEM, Complexity Force, Fractals, Simultaneous Creation, Biblical Creation, Abiogenesis, Frankenstein, Urey-Miller Experiment, Mathematical Model, Dirac Delta Function, Step Function.

In the incessant pursuit of understanding the genesis of life, an array of theories have arisen, most prominent being the theory of abiogenesis. This scientific narrative posits that life emerged gradually from inanimate matter through a series of chemical reactions over billions of years. Yet, a sense of incredulity looms around these theories, inspiring an exploration of alternative hypotheses. Drawing inspiration from Mary Shelley's Frankenstein, where a spark of electricity imparts life to lifeless matter, and the Spiritual Theory of Everything Model (STOEM) with its central idea of a Complexity Force, this paper proposes a novel mathematical framework suggesting a simultaneous origin of life.

The narrative weaves together a tapestry of diverse threads: from Shelley's proto-science fiction, through the experimental implications of the Urey-Miller experiment, to the profound metaphysical assertions of Biblical creation. The intricacies of the STOEM model are dissected, aligning the complexity force with a sudden, unified inception of life.

Our investigation culminates in the development of a mathematical representation that encapsulates this proposed instantaneous creation event. This framework portrays the concept of a step change in the state function representing the sudden appearance of life, coupled with the Dirac delta function illustrating an infinite rate of change at the moment of creation.

Whilst challenging convention, this paper seeks to fuel contemplation and discourse, aiming not to discard but to extend the dimensions of our current understanding of life's origin. The outcome is a rich symbiosis of literature, scientific skepticism, and mathematics, which while ambitious in its scope, holds firm to the pursuit of knowledge and truth.

1. Introduction:

1.1 Overview of the existing theories of life's origins

Life's origins have been a topic of fascination and deep inquiry for centuries. Scientific theories propose a number of possible scenarios, yet three in particular have gained significant traction.

Firstly, abiogenesis suggests that life arose from simple organic compounds that gradually evolved into complex organisms over billions of years. This theory was seemingly validated by the Urey-Miller experiment, which demonstrated that organic compounds could be produced from inorganic precursors under simulated early Earth conditions.

Panspermia, another theory, postulates that life did not originate on Earth but was delivered from outer space, perhaps in the form of microbial life riding on cosmic debris.

Finally, the theory of eternal life posits that life has always existed in one form or another and did not need a definitive starting point.

1.2 Identification of the limitations of these theories and the need for a novel perspective

Despite their persuasiveness, these theories are not without flaws. Abiogenesis, while experimentally supported to some extent, fails to explain how the first self-replicating molecules, precursors to life, could have formed spontaneously from inorganic matter.

Panspermia, on the other hand, simply shifts the question of life's origin to another location in the cosmos. It does not provide a mechanism for the initial generation of life but rather postpones the problem.

The theory of eternal life, while philosophically intriguing, doesn't fit with our current understanding of thermodynamics and the concept of entropy. Over infinite time, all systems should reach a state of maximum entropy, which seems at odds with the complex, organized structures that characterize life.

Given these limitations, it becomes clear that the search for life's origins could benefit from fresh perspectives. This paper proposes a novel hypothesis, one that fuses ideas from literature, science, and mathematics to propose a simultaneous origin of life, governed by a Complexity Force as described in the Spiritual Theory of Everything Model (STOEM). This approach, while certainly ambitious, offers a unique lens through which to examine the enigma of life's beginnings.

2. Mary Shelley's Frankenstein: Animating Matter with Electricity:

2.1 Overview of Mary Shelley's "Frankenstein" and the concept of animating life with electricity

Mary Shelley's magnum opus "Frankenstein" has transcended the bounds of literature to permeate various domains of human thought, one of which is our understanding of life's inception. In the novel, protagonist Dr. Victor Frankenstein harnesses the power of electricity to bestow life upon lifeless matter, creating a creature from inanimate body parts. This event, seen through the lens of science fiction, resonated with the contemporaneous interest in galvanism, a field of study focused on the effect of electricity on biological tissue.

2.2 Discussion of the influence of Shelley's concept on theories of life's origins

Shelley's concept of life creation via electricity has left an indelible mark on scientific thinking. It might be seen as an early imaginative leap towards the theory of abiogenesis, specifically in the subfield of bioelectromagnetics. Here, the emphasis is on the role of electromagnetic fields and charges in cellular processes, touching upon the spark of life that Shelley envisioned.

The impact of Shelley's "Frankenstein" is perhaps most evident in the Urey-Miller experiment, where an electrical discharge was used to simulate lightning in the early Earth's atmosphere. This experiment demonstrated that complex organic molecules, the building blocks of life, could be synthesized from simpler inorganic compounds under these conditions.

However, both this experiment and Shelley's narrative stop short of bridging the gap between the formation of basic organic molecules and the emergence of fully fledged, self-replicating life. This paper attempts to fill that gap by using STOEM's Complexity Force in a new mathematical model that describes a simultaneous and instantaneous origin of life - a grand act of creation.

3. The Urey-Miller Experiment and Abiogenesis: Life from Primordial Soup:

3.1 Overview of the Urey-Miller experiment and the concept of abiogenesis

The Urey-Miller experiment, performed in 1952, serves as a cornerstone in our understanding of abiogenesis, the process by which life arises naturally from non-living matter. Stanley Miller, under the supervision of Harold Urey, simulated the supposed

conditions of early Earth by creating a closed system containing water, methane, ammonia, and hydrogen. This system was then subjected to an electrical discharge to simulate lightning. Over time, this experiment resulted in the formation of amino acids, the building blocks of proteins, which are essential for life as we know it.

Abiogenesis posits that such organic molecules gradually developed into more complex structures, eventually leading to the first self-replicating entities, and consequently, the advent of life. This theory, supported by the Urey-Miller experiment, has been a prominent explanation for the origin of life on Earth.

3.2 Critical analysis of the abiogenesis theory and its limitations

Despite the appeal of the abiogenesis theory and its experimental validation to some extent, there remain several critical issues. The leap from a soup of organic molecules to a self-replicating entity, capable of undergoing natural selection and evolution, remains largely unexplained. The complexity involved in the formation of a simple self-replicating molecule is staggering, and the probability of such an occurrence happening randomly, even over billions of years, is incredibly small.

Furthermore, while the Urey-Miller experiment was successful in producing amino acids, it did not result in the creation of life or even of simple living cells. Moreover, the experimental conditions assumed by Miller and Urey have been questioned by later research, suggesting that the early Earth's atmosphere may have been composed of different gases.

Finally, the abiogenesis theory, while explaining a gradual emergence of life, does not account for the remarkable diversity and complexity of the earliest known life forms. These issues suggest the need for alternative perspectives or enhancements to

the current theory, which is where our proposed mathematical framework comes into play, introducing the concept of a simultaneous origin of life.

4. The STOEM Model: A New Perspective on Life's Origins:

4.1 Introduction to the Spiritual Theory of Everything Model (STOEM) and the concept of Complexity Force

The Spiritual Theory of Everything Model (STOEM) proposes a comprehensive, mathematical framework that seeks to describe the universe and its components in a holistic manner. A key concept in this model is the Complexity Force, denoted as $C[H_\varphi, S] = H_\varphi * S$. Here, H_φ represents the fractal architecture of a system, S represents the state of the system, and C represents the Complexity Force, a theoretical force that drives a system towards higher complexity states.

The Complexity Force essentially serves as a mechanism that can propel a system from a state of lower complexity to a higher one, a transition that is highly relevant when considering the leap from non-life to life. According to the STOEM model, both the fractal architecture and the state of the system play a crucial role in determining its complexity, hinting at an intricate interplay between these elements in shaping the trajectory of a system's evolution.

4.2 Explanation of the STOEM's role in the origin of life

In the context of life's origin, the STOEM model offers an intriguing perspective. The Complexity Force could be the driving force that enabled the transition from simple organic molecules to the first self-replicating entities, marking the inception of life. This theory suggests that life's origin was not a gradual, random

process, but rather, a directed and potentially simultaneous event - a jump in complexity driven by the Complexity Force.

The state function S could represent various physical or biological parameters relevant to the prebiotic system, such as energy state, the concentration of organic molecules, or environmental factors. The fractal architecture H_φ could encapsulate the information of the interconnected network of chemical reactions that potentially led to life's emergence. By evaluating the Complexity Force, we could gain insights into the conditions that made life's origin possible and the potential for a simultaneous origin of life.

5. Biblical Creation and STOEM: A Confluence of Ideas:

5.1 Discussion on integrating Biblical Creation into the STOEM model

The belief in Biblical Creation stipulates a simultaneous origin of life on Earth, where all life forms were brought into existence at once, as described in the Judeo-Christian religious tradition. This concept, although primarily rooted in theology, offers an alternative perspective to the gradual and probabilistic emergence of life as posited by the abiogenesis theory.

Integrating this concept into the STOEM model could imply that the Complexity Force, acting on the prebiotic system, triggered a simultaneous leap in complexity, resulting in the emergence of a diverse array of life forms all at once. This approach doesn't undermine the role of the laws of nature, but rather, considers the Complexity Force as a possible manifestation of divine influence, marking a convergence of scientific and spiritual perspectives.

In this framework, H_φ and S in the Complexity Force could be seen as representing God's 'design' and 'will', respectively. The fractal architecture H_φ encapsulates the divine blueprint for life,

and the state function S represents the divine will or command, with the Complexity Force acting as the divine agency manifesting life according to this blueprint.

5.2 Analysis of the implications of this integration on the understanding of life's origin

Integrating Biblical Creation with the STOEM model introduces a novel perspective to the understanding of life's origins, providing a potential mathematical framework that accommodates a simultaneous origin of life.

The STOEM model, enhanced with the concept of simultaneous creation, offers a possible reconciliation of scientific and religious perspectives, marking a departure from the conventional dichotomy between these domains. While this integration doesn't provide experimental predictions, it encourages a broader, more inclusive understanding of life's origins, which encompasses not just physical phenomena but also metaphysical aspects.

This approach invites further exploration into the mathematical intricacies of the Complexity Force and how it can encapsulate such a simultaneous leap in complexity. Furthermore, it sets the stage for dialogues between science, philosophy, and theology, promoting a multidisciplinary approach towards understanding our universe and our place within it.

6. The Simultaneous Origin of Life: A New Hypothesis:

6.1 Introduction to the concept of simultaneous origin of life

The simultaneous origin of life posits that all life forms on Earth originated at the same instant, as opposed to the widely accepted gradual emergence over billions of years. This viewpoint aligns more closely with certain religious interpretations, such as Biblical

Creation, yet diverges from most scientific theories like Darwinian evolution or the more recent models of abiogenesis.

A simultaneous origin of life provides a radically different outlook on how life came to be, proposing that the leap from inanimate matter to the diverse array of life we witness today was not a slow, gradual process, but an instantaneous event. This hypothesis challenges our current understanding and encourages us to re-evaluate the mechanisms we believe led to life's origins.

6.2 Discussion of the need for a mathematical framework to represent this hypothesis

To offer this hypothesis scientific credibility, a mathematical framework is essential. A robust mathematical model could provide a formal structure that allows us to investigate the conditions under which such an event could occur and assess the implications of such a hypothesis.

The STOEM model, with its concept of the Complexity Force, could be a promising candidate for such a mathematical framework. The Complexity Force might act as a conduit to trigger a simultaneous leap in complexity, thereby bringing about the inception of all life forms at once. This would imply a sharp transition in the state function S, akin to a step function, indicating an instantaneous jump in complexity.

Through this mathematical framework, we can approach the simultaneous origin of life hypothesis with rigor, grounding the philosophical and theological considerations in precise mathematical language. It could provide a novel way to bridge our understanding of life's origins, integrating spiritual, philosophical, and scientific perspectives into a unified narrative.

7. Mathematical Representation of STOEM:

7.1 Detailed explanation of the mathematical representation of STOEM

The Spiritual Theory of Everything Model (STOEM) posits the existence of a Complexity Force (C), given as a function of a system's fractal architecture (H_φ) and its state (S): $C[H_\varphi, S] = H_\varphi * S$.

H_φ, representing the fractal architecture of the system, characterizes the inherent complexity within the system's structure. Each fractal is defined by a specific fractal dimension (φ), a measure of its complexity.

S represents the state of the system, a term that can refer to a variety of physical or conceptual properties, depending on the context. In the context of life's origins, S could symbolize the primordial conditions necessary for life to emerge.

The Complexity Force (C) arises from the interaction between the system's fractal architecture and its state. It represents a driving force pushing the system towards higher complexity states, akin to a "force of evolution."

Mathematically, the relationship $C[H_\varphi, S] = H_\varphi * S$ suggests that the Complexity Force is proportional to both the system's fractal architecture and its state. Changes in either the system's fractal architecture or state can potentially cause shifts in the system's complexity.

7.2 Analysis of the implications of this mathematical representation

The mathematical representation of STOEM provides a basis for understanding how complexity emerges and evolves. By framing the emergence of complexity as a force that arises from the interaction between a system's fractal architecture and its state, STOEM provides a new lens through which we can investigate the origins of life.

In the context of a simultaneous origin of life, the state function S could represent a global condition or trigger that, when met, leads to a sudden and drastic increase in complexity, leading to the spontaneous emergence of life.

The STOEM mathematical framework, therefore, allows us to theoretically explore the conditions under which a simultaneous leap in complexity, and hence life's emergence, could occur. Furthermore, this framework could potentially help reconcile the dichotomy between spiritual and scientific perspectives on life's origin, bridging the gap through a shared language of mathematics.

8. Formulating the State Function:

8.1 Formulation of the state function representing the presence or absence of life

In the framework of STOEM, we seek a mathematical expression for the state function S that can capture the unique condition of life's origin. Here, life is considered a state of high complexity, marked by a significant shift from pre-life conditions. Therefore, we can express this state function S as a Heaviside step function, often used in mathematics to represent sudden transitions or changes.

$S = H(t - t_0)$

Here, $H(t - t_0)$ represents the Heaviside step function, t is the time variable, and t_0 is a critical time threshold. When time t is less than t_0, the function is zero, representing the absence of life. When time t is greater than or equal to t_0, the function jumps to one, representing the presence of life.

8.2 Analysis of the step change in the state function and what it represents

The sudden step change in the state function from zero to one is emblematic of the proposed simultaneous origin of all life. This abrupt transition symbolizes a universal condition or event that instantly and radically increases the complexity of the system—our Earth.

In our context, the step change suggests that prior to time t_0, the conditions were not ripe for life. However, upon reaching the critical time t_0, the system experienced a dramatic increase in complexity, signifying the simultaneous emergence of life forms.

It is important to note that while this mathematical representation is simple, the physical mechanisms and conditions that would result in such a universal step change are intricate and not yet fully understood. This model offers a conceptual understanding and mathematical description of the simultaneous origin of life hypothesis, inviting further exploration and investigation into the possible triggers and conditions that could lead to such an event.

9. The Dirac Delta Function and the Rate of Change:

9.1 Explanation of the use of the Dirac Delta function to represent the rate of change of the state function

To capture the instantaneous nature of the state change at t_0, the rate of change of the state function, represented as the derivative dS/dt, is portrayed using the Dirac Delta function $\delta(t - t_0)$. The Dirac Delta function has the unique property of being zero everywhere except at the origin, where it is undefined, but with an integral over all space equal to one.

The mathematical representation of the rate of change is:

$$dS/dt = \delta(t - t_0)$$

Here, $\delta(t - t_0)$ represents the Dirac Delta function. This mathematical tool allows us to encapsulate the concept of an instantaneous transition from a non-living to a living state.

9.2 Discussion of the implications of this infinite rate of change at the moment of creation

The use of the Dirac Delta function suggests an infinite rate of change at the moment $t = t_0$, the critical time of life's origin. This connotes an immediate and universal transition from non-life to life, reinforcing the simultaneous origin hypothesis.

In physical terms, the infinite rate implies a remarkable event or condition causing a swift, system-wide transition. The nature of this transition event remains an open question. However, this formulation provides a mathematical foundation to further investigate the processes and mechanisms that could cause such a rapid and global change.

The infinite rate of change at t_0 also implies a certain "non-locality" in time for the origin of life. This is analogous to the principle of non-locality in quantum physics, where entangled particles instantaneously affect each other, regardless of the distance separating them. Similarly, the simultaneous origin hypothesis postulates that the origin of life is not a gradual, local event but an instantaneous, universal event—a paradigm shift in our understanding of life's beginnings.

10. The Complexity Force and the Simultaneous Origin of Life:

10.1 Application of the STOEM Complexity Force model to the concept of simultaneous origin of life

Given the Complexity Force equation $C[H_\varphi, S] = H_\varphi * S$, in our context, the system's state (S) could represent the state of life on Earth. Prior to t_0, the Earth was in a non-living state, so S = 0. At t_0, life suddenly appeared, so S stepped to 1. The complexity force, $C[H_\varphi, S]$, then encapsulates the force or mechanism driving this sudden, simultaneous appearance of life.

The fractal architecture of the system, H_φ, could be conceived as a representation of the underlying "design" or potential for life. The Complexity Force is then proportional to both H_φ and S, indicating that the sudden emergence of life (S) could be influenced by this fractal architecture or design (H_φ).

In mathematical terms, the Complexity Force at the moment of creation would be:

$$C[H_\varphi, S] = H_\varphi * \delta(t - t_0)$$

This equation implies that the Complexity Force, at the moment of creation, is driven by a complex interplay between the system's

fractal architecture and an instantaneous shift in the system's state.

10.2 Discussion of the implications and potential insights gained from this application

Applying the STOEM Complexity Force model to the concept of simultaneous origin of life offers several interesting implications and potential insights.

First, this approach bridges the gap between metaphysical or spiritual concepts and scientific and mathematical models. By integrating these perspectives, we can explore the origins of life from a novel and holistic standpoint, transcending the constraints of traditional scientific paradigms.

Second, this framework offers a mathematical basis for investigating the concept of a simultaneous origin of life, which has historically been challenging to explore due to the inherent limitations of empirical approaches.

Lastly, this model may stimulate new thinking about the potential mechanisms that could drive the instantaneous appearance of life. This could include metaphysical forces, high-order physical phenomena, or complex emergent behavior arising from the fractal architecture of the universe.

This mathematical model could provide a launchpad for theoretical explorations, stimulating new hypotheses, dialogues, and potentially even empirical investigations in the long run, blurring the lines between science, spirituality, and philosophy.

12. Caveats and Considerations in the Application of STOEM:

12.1 The Iterative Nature of STOEM and the Concept of Planck Time:

In our discussion, the STOEM model has been used in a way that is based on discrete iterations rather than continuous time. This aspect of the model may seem at odds with our conventional understanding of time as a continuous variable. However, in the realm of quantum mechanics, there is a smallest possible unit of time known as the Planck time. This could serve as the duration for each iteration in the STOEM model. In this view, the simultaneous creation of all life could be understood as occurring over a single Planck time, the smallest conceivable increment of time. The sudden change from a lifeless state to a living state would thus be effectively instantaneous.

12.2 The Order of Creation and the Need for a Functional Ecosystem:

The STOEM model does not inherently dictate the order of creation, but for our hypothesis, we have proposed the simultaneous creation of all life. This perspective is somewhat at odds with the Genesis account, which seems to suggest an order of creation, with plants preceding animals. However, a simultaneous creation event could still be compatible with Genesis if we interpret the "days" not as literal 24-hour periods but as metaphorical periods or phases.

Furthermore, the concept of simultaneous creation can be justified by considering the interdependence of living organisms. For the Earth's ecosystems to function, a myriad of organisms, from plants to animals to microscopic organisms, must all exist in harmony. For example, many animals depend on gut microbiota

for digestion; the existence of these microbiota is thus a precondition for the survival of the animals. The simultaneous creation hypothesis can account for such intricate interdependencies, suggesting that all forms of life, down to the microscopic level, appeared at once to maintain the intricate balance of ecosystems.

12.3 The Dirac Delta Function and the Instantaneous Origin of Life:

In this paper, we have used the Dirac Delta function to represent the instantaneous appearance of life. This function has been used to illustrate the sudden, infinite change at the moment of creation. However, it is important to note that the use of the Dirac Delta function here is a mathematical abstraction, intended to model the suddenness of the creation event. It is not meant to imply any physical processes occurring at infinite rates or any physical quantities taking on infinite values. Instead, it provides a conceptual tool to help us understand and visualize the concept of an instantaneous creation event.

As with all models and metaphors, these should not be taken as literal descriptions of reality, but rather as tools to aid our understanding and stimulate further exploration and discussion. The limitations and assumptions inherent in these models should be recognized, and the models should be subject to ongoing refinement and revision in light of new insights or ideas.