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LIFE

Matter. Evolution. Consciousness. Intelligence.

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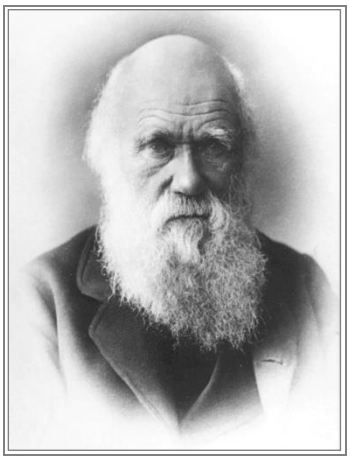
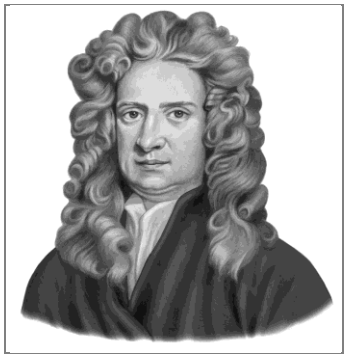
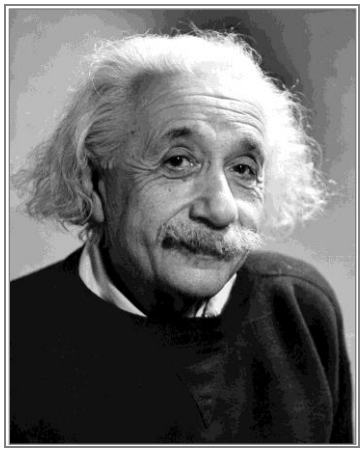
This book represents a humble tribute to all scientists who succeeded through their hard work and their genius to bring a sparkle of starlight into Earth.



Charles Darwin



Isaac Newton



Albert Einstein

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Introduction

This book seeks to shed light on the enduring mysteries that reside both within and beyond us, offering answers to fundamental questions about life and our place in the Universe. Through careful reading and reflection, it may offer readers greater clarity and a deeper sense of purpose.

My principal aim is to develop a comprehensive explanation of the natural world and of life itself, constructing a coherent and unified model of physical reality from a deterministic standpoint. This endeavor is intended as a neutral and objective contribution to scientific knowledge, with the hope of elucidating some of the Universe's most profound mysteries and the origins of life. The analysis presented herein is grounded in a minimalist set of assumptions, relying strictly on logic and rational inquiry. It is obvious that all principles, postulates and theories stated and proved in my previous works ("Prime Theory"[1] and "The Universe"[2]) will serve as a solid foundation to this particular approach. The laws of granularity for space, matter and fields, the theories of relativity and the absolute for the motions of bodies, the universal principles of causality and determinism, all these will also be an integral part of the explanations. We will finally decipher the complicated cosmic mechanism that made possible the emergence and evolution of primordial matter up to its current structures. It is all about the complex changes and transformations that happened over the course of about 14 billion years!

A pivotal moment in this evolutionary continuum occurred roughly four billion years ago, when Earth's primitive environment gave rise to unicellular organisms. The simple aquatic bacteria have evolved rapidly and Life took more and more complex forms over time; fortunately, there was a day when some highly intelligent and well adapted beings emerged, the today's humans. The odds of this kind of life appearing somewhere in our quasi-infinite Universe, the chances that some evolved beings have reached a certain knowledge level and understood why this very special phenomenon happened, are extremely small, and we cannot quantify them accurately. Knowing the infinitesimal value of this probability, humans must show a deep respect for the extraordinary sequence of cosmic events that led to life; they must not forget for a moment that this succession of events and transformations of matter could be unique on the scale of the universe, unrepeatable in this form. And there is no hesitation for me to show what people have done wrong so far – relative to their social life and the natural environment – and what keeps them apart from a natural evolution through science and reason, on the path of *normality*.

All this description has to be founded on a simple premise: the information we receive from the environment through our sense organs is absolutely real and reaches our nervous system as successions of electrical impulses. Moreover, if this partial information processed by the brain constitutes an accurate, objective representation of the physical world, we may state that the *external reality does really exist, it is not an illusion*. Although our senses capture only a limited portion of this reality - for example, the human retina is sensitive only to the *visible spectrum* - the existence of advanced instruments allows us to detect phenomena beyond our sensory range. Human beings, endowed with multisensory faculties and exceptional cognitive abilities, are thus capable of comprehending reality in its full dimensional complexity. Through memory, imagination, and reason, we not only perceive but also innovate, thereby expanding the boundaries of our knowledge.

The observable world around us, all things that are accessible through our five senses, exhibit a material nature and occupies a vast three-dimensional space. Observations at all scales reveal that this reality operates predictably, governed by universal laws. It results that, if we succeed in analyzing today's world, the conclusions we reach can be extrapolated both to the past and to the future. We will thus be able to precisely outline how our world has evolved so far and correctly estimate what will happen next. And here is a serious confirmation for the existence of a tangible reality and for our ability to truly perceive it: our sensory organs did not appear directly in their current form, but gradually evolved over time, their complexity and performance have continuously increased by adaptation to the external environment. This medium, therefore, has an undeniable materiality and this allows us to reinforce the idea: *If we exist, then the outer reality also exists.*

It is interesting to consider the alternative, the *virtual reality*: what if the outer reality would be a perfect simulation, brought and projected directly into our minds? Or, even more, what if *absolutely everything* is a simulation - our life and our senses included – and all material things we perceive do not actually exist in this form? Both hypotheses, in my opinion, are scientifically untenable, and no further analysis will be made on them; the motive is simple, they imply the existence of a creator, a special almighty entity who designed everything for a still unknown reason. And this is not the normal, scientific method to pursue! In addition, the dimensions and immense complexity of this very elaborate hoax would imply quasi-infinite amounts of energy, impossible to imagine and justify. And we must not forget about a logical problem that would arise immediately, catching us in a vicious circle, namely who created this hypothetical creator of virtual worlds? And how, why, when? And so on....

To comprehend the world and its governing laws in their entirety, humans must continue exploring both the microcosmic and macrocosmic realms. Moreover, they mastered almost all the means and have all the intellectual power to undertake this approach. But why do humans have to wonder, research and explore? As beings endowed with great curiosity, humans are an integral part of this complex material reality; they live within it and depend on its structures, so they have to examine and study it extensively. The drive to explore stems not only from their intellectual curiosity but also from practical needs like resources, space, energy, and technology. But can humans, by themselves, to pursuit this endeavor and to eventually find all the nature's working mechanisms? Do we possess the capacity to decipher all these mysteries, including the deepest ones – life in general and our own existence in particular? And could this be accomplished particularly when, as Max Planck would have said, "*the man is part of the mystery*"?

Whatever the correct answer to these philosophical problems may be, it must necessarily include the *physical limits* of nature's materiality and the terms *we have to relate to* our measurements and comparisons. We could say, for example, that here on Earth, our species is the most intelligent one at the moment, but this assertion may not hold on a cosmic scale. This book, however, does not aim to engage in metaphysical speculations or ontological discourses. Instead, it affirms that through reason and intellectual perseverance, *humans are capable of overcoming any cognitive limitations, thereby attaining a full understanding of both their environment and their life.*

"I think, therefore I am" wrote Descartes. In extending his perfect logic, here is my proposal for an updated formulation: "**I think, therefore I live - and it is natural to seek the meaning of my own existence".** However, it is not my aim to elevate the underlying doubt of Descartes' assertion to the level of a philosophical postulate. Rather, the central premise of my theory is *causality* – the foundational principle of the universe, the mechanism by which all things arise and evolve. A number of implications follows from this assertion:

- Human cognition, grounded in accumulated knowledge and prior experiences, gives rise to thoughts and ideas. These ideas can be articulated and shared through language, both spoken and written, illustrating humanity's ability *to communicate*.

- Our thoughts are processes in which the abstract and imagination meet memory and logic; they are continuously "crossing" the complex structure of the human brain, being the results of its high-order functions. Man

therefore *thinks*, and these sophisticated functions of analysis, learning and reasoning interfere with his self and social consciousness, personality, and free will.

- Humans have a certain level of *intelligence* – understood here as an ability to generate adaptative responses to stimuli. This allows for the analysis of sensory data, the execution of appropriate responses, and a growing understanding of the surrounding environment. Such capabilities are rooted in the cerebral cortex, a defining trait that has evolved through successive generations via genetic inheritance. These responses can be either c*oncrete*, as the rapid adaptation to a certain danger, or a*bstract* in nature, as a complex resultant of past experiences. Over time, as neuronal density and synaptic complexity increased, human beings crossed a cognitive threshold and became *aware* of their own existence. This cognitive evolution continues both genetically (at a slow rate) and technologically (at a much faster pace).

If life is viewed as a unique sequence of evolutionary processes governed by the laws of material nature, then we can assert that humanity is merely at the beginning of a pivotal phase - one in which it seeks to fully comprehend its own existence. As intelligent entities conscious of time, we are inevitably driven to ask questions that involve extrapolation and relativization:

What was the "path" we followed to this level? And, if there is another stage of knowledge, what will it look like?

Can we give a clear and absolute definition of life at this point, without having similar terms of comparison?

Specifically, where did we come from? And who are we, humans, really? Are we a unique kind of life-form? And what is the purpose of our existence?

These questions lie at the intersection of multiple disciplines and must be approached through rational, scientific inquiry. Regrettably, humanity's progress in scientific understanding has lagged behind developments in other domains – due in part to historical, cultural, and institutional factors. This intellectual void has been filled over time with mysticism, organized religion, and various mythologies – ideologies that often resonate more due to their emotive appeal than their empirical grounding. Such narratives have proliferated easily, overshadowing the quieter voice of reason.

While we possess a scientific account of life's origin and its subsequent evolution over many millions of years, definitive answers to the deeper existential questions remain elusive. The emergence of primordial life can only be justified scientifically, and among the major factors that favored this process we can mention: the Earth's position in the Solar system, its prolonged environmental stability and the versatility of chemical elements in forming complex compounds. There were many other factors that facilitated the natural development of life, though they do not imply a predetermined purpose or reveal any hidden meaning. Given the critical role of chance in this process, it is improbable that a similar adaptive pathway would yield identical outcomes on another planet. *Note:* Scientists use the concept of "convergent evolution" to explain how different species may develop similar traits when exposed to comparable environmental pressures. Consequently, advanced life forms on an Earth-like planet might conceivably evolve with human-like features.

Furthermore, once we came to understand the evolutionary mechanisms that led to intelligence and self-awareness, a certain level of development was reached, and therefore we may *choose our own purpose of life,* our destiny as individuals and as a species. This much-debated notion of "destiny" – which is forcibly connected to the purpose of life – is not "written" in stars, or elsewhere, it is simply the cumulative result of the choices made by each human being.

1. Our Universe

For millennia, humans have looked to the heavens with deep curiosity, seeking to understand their place in an apparently boundless universe. Current astronomical data enable us to form a reasonably accurate picture of the observable universe: a vast, spherical expanse of approximately 10^{26} meters in diameter, in which several trillion galaxies are spread relatively evenly. Neither the Milky Way galaxy nor our Solar System holds a privileged position; for example, our Solar System resides on the inner edge of one of the galaxy's spiral arms, far from the galactic center. This location has provided a degree of protection to Earth's lifeforms from intense cosmic radiation. Today, our cosmic "address" can be precisely stated: *Planet Earth, Solar System, Orion Arm, Milky Way Galaxy, Local Group, Virgo Cluster, Laniakea Supercluster*.

The same thirst for knowledge and exploration was manifested recently in the other direction, namely toward the microscopic world. This complex realm is extremely fascinating not because it's strange, but mostly because it's the home of the building blocks of life, the living cells. Going deeper, at about 10^{-11} meters we reach into the quantum world, the place where atoms and molecules – the smallest known material structures – are all located. At 10^{-15} meters we meet the elementary particles, the most basic constituents of matter. As said earlier, they do not represent a dimensional limit; according to Prime Theory [1], matter may have a "truly elementary" granularity below the theoretical limit of 10^{-35}m (the Planck length). Within this vast continuum - from the infinitesimal to the infinite - human beings occupy a middle position, roughly one meter in scale; from this unique vantage point, luckily, they have the opportunity to "look" in both directions: outward to the cosmos and inward to the subatomic world.

1.1. Matter and Space

The following principles, premises, and hypotheses pertain to the spatial and material structure underpinning *granular physics* [1] – a foundational mechanics that was proposed to comprehensively explain the movement, transformation, and evolution of all phenomena.

a) We are living in a *material universe* governed by deterministic laws, valid at all times and scales. This principle shall extend and apply to all models of the universe, namely the closed, open or flat ones. *Essence*, the primordial material [3] that has been previously introduced by my theory, is the sole

constituent of the structured matter and of the spatial fluid [1]; in its actual granular form, this material features a state of perpetual motion.

b) At the granular (sub-quantum) scale, nature follows these simple laws:

- All granules move in straight lines at an absolute (superluminal) speed C.
- All granular collisions are perfectly elastic and conserve energy.
- Both granular momentum and kinetic energy remain constant over time.
- The net sum of all granular momenta in the universe is zero.

c) Regardless of the cosmological model we would adopt – whether the Big Bang or a distributed origin as suggested in [3] – one fact is evident: approximately 14 billion years ago, the granular density of space was significantly greater than it is today. This elevated density led to several key outcomes:

- Space has undergone continuous expansion. Initially compressed, the spatial granules changed their elastic to energy kinetic energy and then spread into an expanding volume.
- High granular density enabled the granular fluxes to spontaneously produce *quarks*, which quickly have bind together and formed protons and neutrons. Upon cooling, stable electrons allowed for the formation of Hydrogen and Helium atoms. A slight *matter-antimatter* asymmetry resulted in a surplus of matter that seeded the first stars.
- The spontaneous creation of elementary particles ceased at a certain point, once the granular density of space fell below a certain *threshold* (see [7], *The Formation of Elementary Particles*).
- The granular fluxes – identified as gravity – have immediately started to concentrate the remaining atoms and thus the first chunks of matter were formed; these chunks have rapidly increased in size and mass, gravitationally accreting more gases from around. But there are two more roles of the granular fluxes: they ensure the shape and stability of all elementary particles, and, at the same time, they allow all known fields to propagate.

d) All interactions, transformations, and motions of matter are inherently deterministic, irrespective of how spatial parameters evolve over time. As the laws of physics have governed the universe since its inception, invoking a divine creator becomes unnecessary. The initial inhomogeneities in granular distribution are responsible for both micro and macroscopic randomness observed today.

1.2. Time

Time is a physical quantity that reflects a unique property of matter: at the smallest scale, matter is composed of discrete, perpetually moving granules. The speed of this motion determines the maximum rate at which time progresses. Whether these granules exist as fluxes or particles, they move at a constant absolute velocity. This internal "pace" of matter will implicitly extend to the macroscopic level, fixing a maximum "speed" for objects or a minimum time interval for events [15].

Therefore, all material bodies may freely move through space, but they cannot do this faster than the speed of light. Now is very clear why the laws of relativity [4, 6], applied in the broader context of the *Theory of the Absolute* ([2], Chapter 3), justify the time dilation for a generic material body moving at different absolute speeds (see the related articles [9] and [12], *Mass-energy equivalence* and *Relativity*).

An absolute time, with its maximum rate of passage, can characterize a homogeneous universe at a given time; this rate, however, will depend on both granular velocity and granular density, which mathematically means the *speed of light in a vacuum*. This perspective on time allows us to better identify the two constituent parts of our universe: *geometric space* (seen as a framework) and *granular matter* (seen as directional fluxes). These parts together form a continuum, a special fluid that we could call space-matter; however, for simplicity's sake, we keep the term *space*. The internal "rhythm" of the structured matter is therefore given by the characteristics of space and is reflected by the absolute speed at which matter can move through it. The presence of gravity, i.e. the unevenness caused to granular fluxes by the massive cosmic bodies, also affects time and slows down its rate by decreasing the speed of interactions between matter's constituents.

1.3. Energy

As described in the first chapters of the Prime Theory [1], matter in granular form self-distributed uniformly throughout three-dimensional space, forming a granular fluid – a continuous medium with distinct properties, as previously defined. A portion of this primordial matter quickly condensed, and small granular vortices transformed into stable elementary particles. These particles eventually reached "thermal equilibrium", enabling the formation of the first atoms of ordinary matter. Over time, gaseous atomic clouds underwent accretion, forming various cosmic bodies – thus, the earliest stars and stellar groupings emerged. The atomic material (primarily simple H/He atoms) was compressed gravitationally and, at some point, it simply ignites. Within the

newly born stars, under extreme temperatures and pressures, atoms fused to produce increasingly heavier chemical elements, up to and including *Iron*.

Globally seen, accretion and fusion processes represent in fact a reconcentration of the universe's primordial energy – which was purely mechanical in nature, as previously established. Specifically, it is the energy of the spatial granular fluid, a significant portion of which later organized into these structured material forms. Hence, vast amounts of energy – manifested as mass – became concentrated in relatively small stellar volumes. Depending on this mass, after millions or billions years of burning, superdense stars may have radically different fates. For instance, some will collapse and subsequently explode (as supernovae), potentially forming small black holes. In such stellar explosions, immense energies are rapidly concentrated and transferred, intensifying the fusion reactions that yield elements heavier than iron. These new elements dispersed into surrounding space, becoming the "raw materials" from which another generation of stars, planets, and moons will form through further accretion. This process – primarily driven by gravity – selectively concentrates matter (usually in gaseous or cosmic dust form) based on atomic masses and chemical affinities and leads to partial separation by atomic and molecular composition. At specific distances from stellar cores, large quantities of similar substances may accumulate. Later, quasi-circular orbital motion leads to collisions among small cosmic bodies, amalgamating and compacting those chemical substances into diverse and complex mixtures. The high temperatures and pressures resulted in this way facilitate new types of chemical reactions, generating unique substances, alloys, and compounds otherwise unattainable. The mechanisms behind star and protoplanet formation were essential in the causal chain leading to life's emergence. Whether gradually or "violently", these cosmic forges generated all primordial materials and established the conditions for combining them into more complex molecular structures – the indispensable building blocks of future living organisms.

We have seen how the energy of the spatial fluid concentrates over time and how simple chemical elements transform into heavier elements as a result of fusion reactions inside stars. In these processes, a fraction of energy is released in the form of electromagnetic radiation – that is, photons that cover almost the entire spectrum of frequencies, including the visible range. Energy is sent, practically throughout the lifetime of a star, to its planets and moons; therefore, there is a continuous energy flow that can heat the atmosphere of a celestial body and catalyze certain chemical reactions anywhere on its surface.

1.4. Complexity and Diversity

Although the total mechanical energy of the universe's granular material remains constant over time, its specific manifestations can vary considerably. Ordinary matter – viewed as aggregations of elementary particles – initially appeared as simple chemical elements (H and He), later diversifying through those fusion reactions within stars. This entire process has taken place under the influence and regulation of a single force: *gravity*. Though its intensity may have fluctuated over time, gravity consistently maintained its creative and formative role. Almost paradoxically if we think of the *entropy principle*, matter did naturally and rapidly form in this way increasingly complex structures.

Cosmic entities continuously underwent state transformations, interspersed with relatively long periods of stability. Gaseous material and cosmic dust, dispersed at the end of supernova lifecycles, gradually recondensed, giving rise to new, smaller, and longer-lived stars. Concurrently, new formations emerged – the protoplanets (see Sec. 1.3), which have benefited from the full range of chemical elements previously synthesized via the fusion processes.

This expanding array of chemical elements enables the natural formation of increasingly complex structures. The discrete energy levels of electrons within atoms determine several types of chemical bonds they can have; this allowed *complex molecules* to appear and substances with distinctive physicochemical properties to form. Importantly, quantum mechanics imposes an upper limit (in terms of atomic mass) on the stability of elements; yet, in practice, this has no significant observable effect. The potential combinations of over 118 known chemical elements are virtually limitless. A special case is the *Carbon* element, which, due to its unique capacity to form long atomic chains (catenation), can generate more compounds than any other element.

Gravity, as previously noted, increases the energy density of matter, indirectly fostering the rise of its complexity over time. It is for this simple reason that the first cells, the primitive life forms could spontaneously emerge. Life, continuously adapting to the environment, has evolved for millions of years, attaining ever-higher levels of complexity (see Figure 1). In brief, the driving force here has been the intrinsic "need" of living organisms to adapt to their environment, adjusted by the influence of randomness and various natural factors (including global catastrophic events). While the creation of artificial heavy elements is almost over, organic matter may still increase in complexity

through natural processes. Moreover, humans can achieve dramatic leaps in complexity when coupled with scientific research, innovation, and technology.

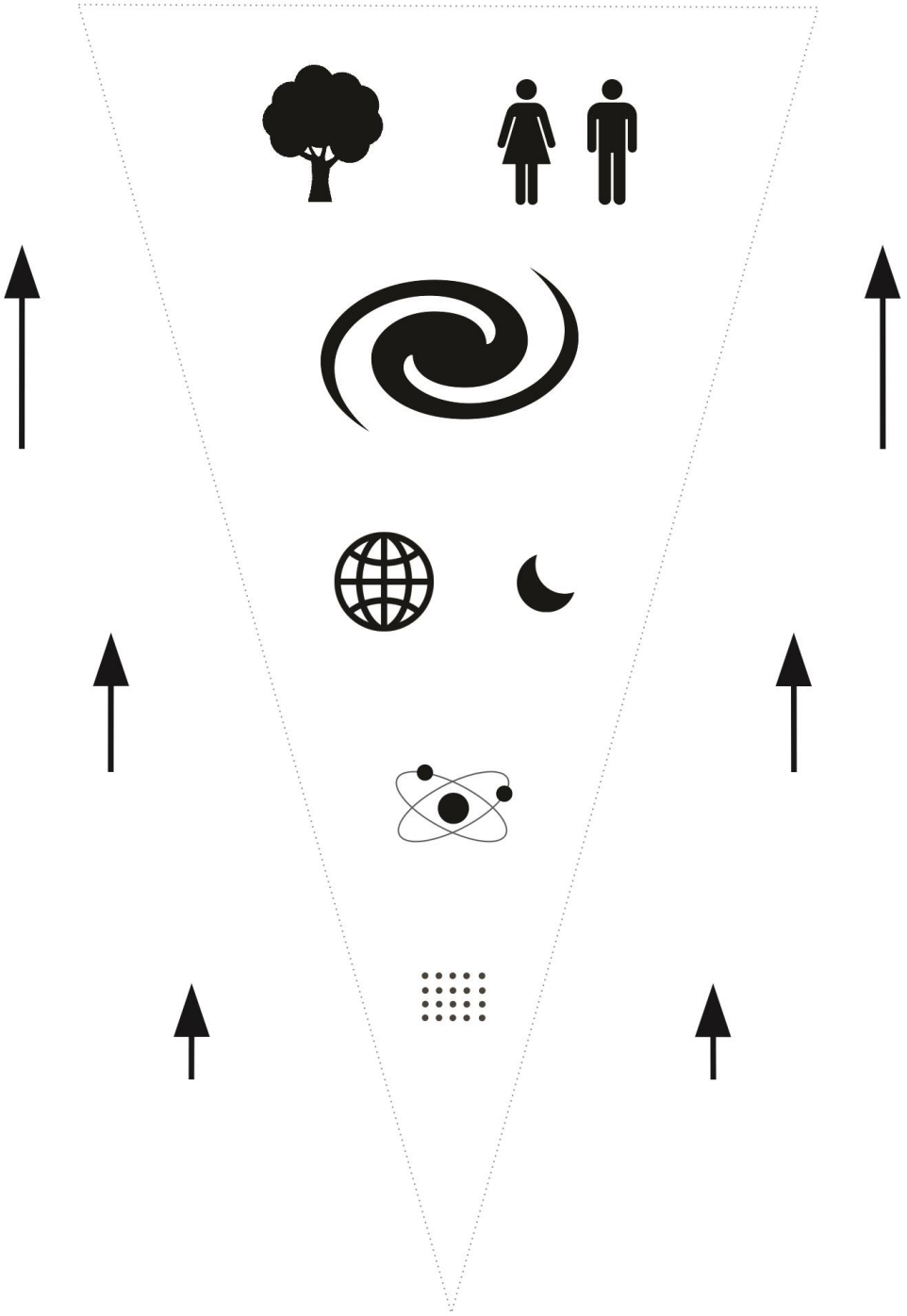

Figure 1 - *Complexity of the material structures*

1.5. Consequences

My mechanistic model of the universe is governed solely by the laws of granular dynamics, maintaining a fully deterministic character at every scale of observation. It describes the underlying mechanisms of reality and provides a coherent explanation for the sequence of events that shaped the current cosmic landscape. In doing so, it addresses the lack of theoretical foundations in microscopic physics and illustrates how the interplay of primordial matter and space gives rise to the fundamental rules that govern all higher-dimensional structures.

For instance, the passage of time at the macroscopic scale is determined by processes that take place at granular level. It is the same level where we find the absolute source of motion for all particles and material bodies, as we extensively described in [2]. Ordinary matter, regardless of its state or position in the universe, originated from a single source and this endowed it with a unique set of properties. Granular fluxes will continuously aggregate and reshape this matter, effectively concentrating and reconverting a constant amount of primordial energy.

Once this „given" of nature is understood at both sub-quantum and quantum scales, it becomes straightforward to explain the formation and evolution of celestial bodies under the dual influence of randomness and causality. The vast number of elementary particles, the wide variety of interactions among them, the immense spatial expanse, and a virtually unlimited time interval allowed the natural emergence of even the most improbable structures. Energy fields bind elementary particles and atoms into larger formations, some of which achieving stability under certain conditions. Thus, new entities with emergent properties appeared spontaneously and naturally, and our simple duty is to observe and understand them all.

From this global perspective, we learned that the most appropriate term to describe the universe's dynamics is *self-organization*. Granular mechanisms, regardless of the scale at which reality is examined, are solely responsible for the spontaneous transformations of these complex structures. At the quantum scale, where the act of measurement alters particle states, deterministic outcomes must be replaced by *probabilistic* ones. All mechanisms through which matter "operates" here are characterized by observational uncertainty. However, this uncertainty gradually turns into certainty as we move to the macroscopic level. Consequently, the future state of an isolated system

becomes predictable at the macroscopic level, being the "sum" of all its microscopic states. The properties of such systems will consequently reflect the speed limitations inherent at lower scales, while the granular perspective adds several further characteristics to them:

- The constancy of superluminal speed C, along with the assumed granularity and uniformity of space, makes it impossible for any granular structure (such as particles or photons) to exceed the maximum speed c – the speed of light in a vacuum.
- For the same reasons, any granular structure is also subject to the principles of relativity, meaning it cannot move simultaneously through space and time at the same "speed" (as the local time is determined by its absolute motion and its interactions).
- Dynamic mass [9] increases at relativistic velocities due to the reorientation of elementary impulses within particles – a phenomenon similar to the asymmetry of granular flows in a strong gravitational field, which causes similar relativistic effects.
- Assuming a quasi-constant granular density, the laws of granular mechanics keep the same parameters over vast time scales (in any case, global changes cannot be detected from within a fully connected system). Thus, the magnitude of the various interactions and binding forces will remain unchanged over such intervals.

The stability of matter, which originates from the level of its granular density, can therefore be sustained for many billions of years to come – even if our universe will undergo an accelerated expansion.

2. Earth, a Special Planet?

At a certain moment in time, on a particular planet within the Universe, the temperature of the crust dropped significantly, and the surface magma solidified to a certain depth. Alongside this process, some chemical elements also solidified, while others remained in liquid or gaseous states. We can now describe, in greater detail, the environment that has developed on the surface of this planet and the configuration of the cosmic system to which it belongs:

1. The presence of a wide array of chemical elements. Under specific conditions of gravity, radiation, pressure, and temperature, they can combine to make more complex substances. Among these elements, *Carbon* stands out for its extraordinary ability to form numerous bonds with other elements, such as *Hydrogen*, *Nitrogen*, and *Oxygen*.
2. The presence of liquid water. Thanks to its polarized molecule (H_2O), water can easily mediate chemical reactions, dissolve a wide range of substances, and transport soluble chemical elements in both liquid and vapor forms.
3. The presence of active volcanoes. They can erupt and bring to the surface heavy elements from the planet's interior. Upon contact with water or the atmosphere, the liquid magma cools and solidifies, often forming distinct landforms. In any case, some heavy elements eventually interact with water and dissolve easily.
4. The existence of a protective atmosphere. Composed of gases such as *Oxygen*, *Carbon Dioxide*, *Nitrogen*, and *Ozone*, it can facilitate the combination and transport of certain chemical elements and acts as a shield against meteorites. It also filters a large portion of ultraviolet radiation from its sun, enables a continuous water cycle, and warms the planet's surface (the greenhouse effect). Additionally, fast electrical discharges can occur between clouds and the ground.
5. Electromagnetic radiation emitted by the nearby star. With various wavelengths, this radiation provides a surplus of energy that can initiate and sustain diverse surface-level chemical reactions and several geochemical cycles. Infrared rays warm the atmosphere via the already mentioned greenhouse effect, while ultraviolet and higher-frequency rays can ionize substances that absorb them.
6. The planet's rotational and orbital motion, along with its axial tilt, lead to the alternation of day and night and the succession of seasons at middle and high latitudes.
7. Natural radioactivity in the soil, generally of very low intensity.

8. A planetary magnetic field, strong enough to act as a natural barrier against cosmic and solar particle radiation.
9. A large land surface: varied topography, moderate climatic variability (in terms of temperature, pressure, humidity, wind, and precipitation), and the presence of rivers, lakes, seas, and oceans.
10. A gravitational field that is capable to hold the atmosphere around the planet and generate sufficient atmospheric pressure.
11. A large natural satellite (a moon), which plays a crucial role in stabilizing the planet's rotational axis.

This planetary attributes are the result of the natural, coordinated action of multiple factors - ranging from the massive *meteor bombardment* to the planet's *ideal distance* from its central star and neighboring gas giants. After an initially violent period, the planet's surface stabilized; moreover, the favorable environmental conditions remained relatively constant over a long time span.

A truly special planet called Earth formed approximately 4.6 billion years ago. After several hundred million years of turbulence and instability, it came to fit perfectly into the quasi-stationary profile described above. Favorable environmental conditions, combined with the randomness of extreme weather phenomena and massive tectonic shifts, enabled natural processes in which matter increased its intrinsic order and began to self-organize. These latter events, primarily occurring in water, gradually led to the emergence of new, larger, and more diverse molecular structures. Solar energy catalyzed these processes, eventually giving rise to a stable molecular structure capable of retaining its form and spontaneously replicating itself. Things continued on this path and soon led to the emergence of photosynthesis—a pivotal moment when the accumulation of atmospheric oxygen (O_2) and the formation of a protective ozone (O_3) layer have both started.

Even more complex structures – unicellular and multicellular organisms – appeared during a subsequent stage, ushering in a biological "explosion" of life across various regions of the planet. These living organisms consume chemically stored energy (oxygen and water) and radiant energy (light and heat), interact, transform, reproduce, and spread rapidly over increasingly larger areas.

In this vast natural laboratory that is Earth (it could be any similar celestial body), where all chemical elements are present and where climate changes occur cyclically, there is a virtually infinite number of possibilities for substances to make random combinations. It was only a matter of time until the first cell – a structure whose distinct properties correspond to a living organism – has

emerged. Still, the probability of this event was extremely low. A specific sequence of molecular combinations and a particular succession of processes had to occur over a very long duration. As noted in the *Drake Equation*, life is possible on many other planets and moons in the galaxy and the universe – especially if they are located within habitable, or "Goldilocks" zones. Similar sequences of events may also lead to life on those planets, although such life may not resemble that on Earth. Nevertheless, one certainty follows life's appearance, wherever and however it would occur: *evolution.*

Note: The presence of life's "building blocks" in Earth's primordial ocean may have been caused by external factors – such as the transfer of organic molecules from space via comet and asteroid impacts (panspermia). While such a transfer merely shifts the origin site of these molecular structures, its implications are significant: it increases the likelihood of life to be hosted on the other planets and moons of the solar system! Furthermore, it shows that life could be more widespread than previously thought – around other types of stars and beyond traditional habitable zones – thus broadening the scope of our search for extraterrestrial life.

3. The Theory of Life

The intrinsic nature of matter allows atoms and molecules to form complex and relatively stable structures through known fields, particularly the electric field. Chains of atoms in various sequences – especially those centered around carbon – are naturally formed in energy-rich environments. Molecular structures are continuously created and dissolved until some of them become perfectly stable and reproducible. Life is based on such macromolecular structures and their replication mechanisms – in our case, ribonucleic acid (RNA) and deoxyribonucleic acid (DNA) [13]. This is how the transmission of "blueprints" to future generations becomes possible, this is how life can change, adapt, and evolve. This mechanism is common to all cells, fundamental to all forms of life on Earth, and it was the key factor that enabled the evolution from unicellular organisms to humans over approximately four billion years.

But how can life truly be defined? And what about intelligent life?

Are we, as humans, capable of analyzing and understanding our own life?

3.1. A General Definition of Life

Life is a set of mechanisms and processes characterizing the "functional" state of a complex material entity, through which it grows, develops, transforms, evolves, and reproduces independently by continuously exchanging energy and matter with its surrounding environment. The fundamental feature of life is its temporality, the finite period of time during which the physical organism that supports it can "function". In order to survive over time, a particular type of living organism – identified by certain peculiarities and defining characteristics – must possess a special mechanism of division or reproduction, that is, it must be able to create some copies (duplicates) with similar morphological and functional attributes.

The history of life's genesis on Earth involves several key stages, each marked by significant environmental changes and biological leaps. Below are a few relevant stages:

The Emergence of the First Living Cell. The primordial ocean, rich in nutrients, combined with heat and solar radiation, needed only time to produce the first viable cell. As with the formation of elementary particles, carbon-structured

matter took a natural step toward self-organization. A kind of lipid-based membrane, a few amino acids arranged in a unique architecture, and some chemical energy [11] comprised the simple ingredients from which the first cells spontaneously emerged. The rest was pure chance, evolution and adaptation. The physicochemical properties of carbon allowed nature to construct two of its most valuable creations: diamonds deep within the Earth's crust, and life upon its surface.

Note: It is also possible that the first living cells originated deep in the oceans, near hydrothermal vents, or in surface waters near active volcanoes.

The Emergence of Multicellular Organisms. The initial cell was separated from its environment by a filtering membrane, enabling the selective transfer of certain substances. This cell subsequently grew beyond a critical size and divided into two similar corpuscles, continuing the development process – now as a unitary organism. *Note: Researchers hypothesize the existence of a universal common ancestor for all Earth's organisms, known as LUCA – Last Universal Common Ancestor – believed to be the precursor of the three major* groups of organisms*: Bacteria, Archaea, and Eukarya.*

Replication Mechanism via DNA/RNA Chains. DNA consists of organic molecules – adenine (A), cytosine (C), guanine (G), and thymine (T) – that form a double-helix spiral where genetic information specific to individuals and species is encoded. DNA duplication occurs by unwinding this double helix with the aid of proteins [13], allowing canonical information to be copied and passed on to new cells and subsequent generations. Notably, variations or errors may naturally or forcefully arise in the gene sequences due to mutagenic environmental factors. This is how individual differences, biodiversity, and even new species emerge. Within the same species, more resilient individuals may pass on advantageous traits to future generations.

The Onset of Photosynthesis. When primitive organisms began producing and releasing oxygen, a biological explosion of diversity followed. This energy-carrying gas easily reached other life forms, enabling simpler, faster, and more efficient chemical "fueling".

Emergence of Sensory Organs and the Nervous System. A major breakthrough came with the development of a new internal structure – a network of specialized cells called neurons – that could efficiently process sensory input and issue appropriate responses. This performant structure also contributed to the

"automation" and optimization of vital internal systems essential to the organism's overall "functionality".

Adaptation, Natural Selection, Intelligence, and Self-awareness. Intelligent life emerged through repeated refinement of the aforementioned mechanisms, where increasingly complex internal structures evolved – particularly the brain, the most crucial organ of the central nervous system. This facilitated the development of high-level functions across animal species. Layers and specialized neuron regions formed, enabling rapid evolution toward communication, language, abstraction, intelligence, and complex interactions – culminating in human self-awareness.

Sexual Differentiation in Advanced Organisms. This differentiation accelerated adaptation and increased intra-species variability.

Natural Disasters and Mass Extinction Events. Life's trajectory has also been shaped by global catastrophes that wiped out entire species (volcanic eruptions, global temperature shifts, expanding ice caps, cosmic gamma-ray bursts, massive solar flares, and large asteroid impacts).

3.2. The Definition of Intelligent Life

A life form equipped with a developed nervous system can adapt rapidly and efficiently to change. It gathers external information via specialized sensory subsystems, processes this data quickly, and generates an appropriate (often automatic) response. A larger brain volume implies more neurons – the core cells of the nervous system – and hence, a vastly expanded network of neural connections. Once the basic neural functions such as perception, learning, memory, and reaction advance, the organism's environmental adaptability and intra-species interaction advance as well. Communication – by any means – significantly enhances survival and reproduction, effectively increasing *intelligence*, seen as a superior capacity for adaptation and optimal response. With the growing number of neurons, a critical threshold was inevitably surpassed. The resulting qualitative leap enabled the human species to develop *self-awareness* – an ultimate form of adaptation for an intelligent being.

Intelligent life – and now we are talking about modern humans – entails a suite of advanced cognitive capacities tied to self-awareness: reason, free will, logic, and morality. The primal instincts of early hominids gradually evolved into *thinking, understanding, anticipation, calculation*, manifesting both individually

and socially. Social bonding, evident in many evolved organisms, played a vital role in the accelerated development and adaptation of specific species.

Intelligent life can be likened to a complex set of procedures implemented and executed within an artificial computing system (such as a robot), which, while running, exchanges information, matter, and energy with its environment and subsequently makes beneficial decisions. This system learns from past experiences and improves its future decisions accordingly; in other words, it uses "intelligence" to increasingly adapt to its environment. These ideas are well-known and do not need reinvention or retelling, but a deterministic approach could shed new light on our understanding of natural phenomena related to life's origin on Earth. Furthermore, once these mechanisms are understood, they may quickly trigger a transformation in human thinking. Ideally, this will lead to a new evolutionary and adaptive leap, elevating humanity intellectually and bringing it closer to a cosmic dimension that must be reached in the near future.

3.3. Consciousness and Intelligence

Consciousness is a novel functionality that naturally appeared as humans fully adapted to their environment, a direct result of the increasing complexity of their brain structure. More precisely, consciousness is an *emergent property* of a vast neural structure, a functional trait that arises when this network of neurons surpasses a certain threshold of complexity. Clearly, it can also be viewed as an evolutionary extension of instinct, but it is more than that. It represents a higher degree of performance in understanding the surrounding reality, a correct and rapid interpretation of the information received from the sensory organs, and at the same time, a personalized, significantly more "intelligent" reaction to stimuli. This response surpasses instinct and imitation, involving reasoning, understanding, and extrapolation from previously accumulated knowledge.

The material substrate of consciousness, like that of intelligence, consists entirely of the human central nervous system. What we are dealing with is this superiorly organized and interconnected material structure – the brain – which, through successive accumulations and transformations, achieved a major leap and reached a new functional level. This is not a forced extension of an economic truism, but rather a straightforward statement of a reality that resulted from human evolution over millions of years.

A generic living organism receives information from its internal and external environment through the nervous system, and it then responds in a programmed and instinctive manner to fulfill certain individual and collective needs, such as:

- preserving its own life and integrity, or that of the group
- maximizing the quantity and quality of food, or gaining easier access to it
- defending or expanding its own territory, and repelling other species
- securing the optimal mate for reproduction, and eliminating competition
- ensuring comfort/safety/resources for itself and other members of the species or group

These responses – more complex in more evolved organisms – are continuously memorized and categorized, while the cumulative experience is incorporated into a mechanism for improving future decisions. This self-adjustment and optimization process is relatively slow but can provide everything necessary for the species to thrive and for its most suited members to survive and reproduce.

There are, of course, exceptions to this mechanism – namely, evolution through "leaps." Even DNA, the macromolecule that underlies biological replication and the transmission of the "good" genes from more adapted individuals, can sometimes produce qualitative leaps through certain "errors". The genetic chain may accidentally alter due to various factors (as already mentioned: mutagenic chemicals, radioactivity, electromagnetic fields, radiation, etc.) that disrupt the accurate replication of the entire DNA helix. This process can give rise to individuals who are different – potentially superior in certain respects. But even along this path marked by evolutionary hazard, increases in the number of neurons and in their interconnections can occur. Better adaptation requires a faster intake of stimuli and more space to store previous experiences. When the senses invade the nervous system with new signal patterns, specific brain areas may expand to process them, others to memorize them, and others to generate appropriate responses. As the interconnection of these areas with the rest of the neural structure leads to a superior accuracy of the senses, it is natural that evolved functions emerged to take advantage of this – such as strategies, tactical planning, foresight, and predictive thinking.

We must now introduce the social dimension into this equation – the group and the family – emphasizing the fundamental role they have played and continue to play in individual development. Social and familial bonds ensure *success* and protection, offers the safety in numbers and many other things.

Progress in this direction is proving to be very rapid for larger groups or communities. In the case of higher mammals, whose nervous systems and senses are already sufficiently developed, new evolutionary stages begin: verbal communication between individuals, collaboration, joint efforts in acquiring food or defending territory, and the fabrication of the first tools.

These steps continued to enlarge the central nervous systems of hominids and were decisive in the emergence of self-awareness and the recognition of each individual's role and position within the group and species. Communication is the complex function that, in my view, played the most critical role in triggering the process of self-awareness and intentional action within a social and environmental context.

Once this budding form of consciousness emerged, the path to our current level of complexity was completed in a relatively short historical time span – about two hundred thousand years. However, the challenges of this type of adaptation – let us call it neurobiological – ended at this moment, as did the morphological transformations of the human body. Humanity has responded to all terrestrial environmental challenges; the modern human is now fully adapted and integrated into the ecosystem. The current level of human consciousness can be characterized as stable, representing an optimal evolutionary response to the relatively minor changes in Earth's physical environment. Only a significant and prolonged alteration of this environment could cause further modifications in the human nervous system, and this seems unlikely to happen in the near future.

Human beings have come to understand their habitat, their biological nature, and the manner in which they emerged as living organisms. But evolution has not stopped here, there are at least three more paths that can be followed. The first is genetic manipulation – a complex and currently uncertain process in terms of results, and one considered by many to be immoral. The second is the development of an artificial intelligence system significantly more powerful and faster than the human brain. Such a system is undoubtedly scalable and dynamically configurable, and it could reach a blurry threshold where the difference between its simulated consciousness and a real one becomes almost indistinguishable – where its artificial nature could be accepted as an alternative form of the natural. In my opinion, contrary to Stephen Hawking's view, artificial intelligence is not intrinsically dangerous, its simulated consciousness would not automatically make it "turn" against its creators. AI is designed by humans for their needs and should, in principle, remain under their control. Unfortunately, AI is only as "good" or "bad" as its designers and users –

thus it can be either a tool or a weapon. There is also a third path, that of human-machine hybrids, but this is more of an extension of human natural power and capacity than a truly innovative leap forward.

Key Features of Consciousness

Consciousness as a function. Consciousness is a higher-order function of perceiving and understanding reality. It is the means by which we can represent abstract concepts and things for which we have no clear references. Through consciousness, we enhance the power of reasoning and expand the boundaries of human knowledge. This level of integration and adaptation to the natural environment – a level achieved by man through his mind and intelligence – appears to be maximal at present. Abstract thinking, projection, understanding, and the totality of accumulated, transmitted, and shared human experience will enable the progress and development of our species, its expansion into cosmic space, and the continuity of its existence in the universe. Consciousness, like reason, offers us a great chance in this endeavor; certainty, however, is given only by the concrete action of all people and of each of us.

Consciousness is Individual. Consciousness is an individual trait, but it also possesses social dimensions. In this context, it is important to address the intrinsic capacity of the human brain, now regarded as the material basis of consciousness. The data acquired from sense organs is continuously compared with some stored patterns, and this differential analysis has greatly accelerated human perceptual and interactive capabilities. This is how more mental models for objects or events emerged and were reinforced through repetition and learning. The brain's capacity for parallel processing across large cortical areas expanded, while socialization stimulated the need for communication and the emergence of language. This led to the sudden development of a new function, *consciousness*, which in historical terms appeared in a blink of an eye. After this brief transition phase, modern humans began to communicate more effectively, reason, and act consciously based on analysis rather than instinct or reflex. Each individual develops his own will, his personality, combining the inherited traits with those formed through education and personal experience. Man quickly grasps the advantages of belonging to a larger group – an effective solution for protecting his family and his relatives. Now, decisions are no longer predominantly instinctual but rational; the modern human becomes "aware" of consequences, while his free will may fully manifest in all its positive and negative dimensions.

The negative effect of consciousness. With the development of this new capacity, early humans expanded their investigative activity toward both their environment and their own species, thereby generating many new questions to which they had no rational answers at the time. Internal conflict quickly arose, automatically producing all the fears associated with the inexplicable. Life and death, light and darkness, fire and thunder – none of these could be understood back then, so it was very easy for them to invent all-powerful, protective deities in which to believe. From that point on, both human consciousness and subconsciousness became dominated by the concept of a creator – a supreme being that "controls" all things and all individual destinies.

The material nature of consciousness. The direct association between the human brain – as the sole repository of consciousness, memory, reason, and the defining self – and the materiality of this highly complex structure is evident and no longer requires demonstration. In fact, we are represented at any given moment – disregarding for a moment the entirety of the human organism – by the totality of inter-neuronal connections, synapses, and the electrical impulses that constitute our thoughts, sensations, and reactions. What we are discussing here is the complex organization of neuronal structures, their interconnections, chemistry, and electricity. On a discrete substrate of highly organized cells, flows of electrical fields implement all brain functions, including the higher-level ones. *Subtle* forms of energy traverse the multitude of electrical circuits, transferring information between groups of neurons and thus enabling our thought and memory processes.

The connection between two neurons is called a *synapse*. The signal transfer function at this neuronal level has two primary characteristics: a slight delay between input and output, and a variable resistance that depends on the train of electrical impulses. This "summation" mechanism, along with repeated stimulation of neighboring inactive neurons, can lead to the creation of new neurons and therefore can enhance the pattern recognition in signal flows. Neuron groups thus self-organized and "trained" can generate – on a higher structural level and in response to certain inputs – complex automated responses and rapid decisions, thereby avoiding energy-intensive computation. This represents a natural optimization of various brain functions, especially useful for unconscious control of repetitive activities. One example is walking – an activity that involves numerous muscles and does not require continuous motor control through conscious commands.

The Structural Nature of Consciousness. The human brain – this extraordinary construct composed of approximately one hundred billion interconnected neurons – houses virtually everything that defines us as intelligent beings. Constant waves of electrical impulses traverse its circuits all the time, „concealing" what we think and what we feel at any given moment. Specialized regions and intricate neural architectures encode our talents, imagination, rationality, and responses to external stimuli. A single neuron connects to about ten thousand others, offering an intuitive sense of the immense "power" hidden in the brain's cellular structures.

Large regions of the brain are dedicated to sensory processing, particularly vision, enabling rapid response in critical situations. A notable example of structured organization is the cerebrum (comprising roughly 85% of total brain mass), a section divided into two hemispheres that are connected by the corpus callosum. It governs all higher cognitive functions, including consciousness. The left hemisphere predominantly controls the right side of the body and specializes in language processing and logical reasoning. Conversely, the right hemisphere governs the left side and is involved in spatial information processing, facial recognition, and musical perception.

General Characteristics of Specialized Brain Areas:

- These regions can be cultivated, trained, and developed over time through study, experience, and practice – essentially, through any form of learning.
- Their activity persists even during the states of rest, such as sleep.
- They possess a dominant genetic component, inherited to varying degrees from each parent. Chance also plays a significant role in their development.
- These areas may evolve or regress over time – depending on how much we „use" them. Everything we learn, whether as rational decisions or automatic responses to stimuli – memories, impressions, words, ideas – can either be better retained or lost. Recalling something or repeatedly engaging a specialized area helps strengthen specific neural pathways and consolidate information. We are constantly storing in our long-term memory, but we also forget a lot of things. Individual personality traits – subjective notions such as pleasure, aversion, or utility – create a unique configuration of these specialized structures. This personal "mask" overlays the initial "firmware" we are born with, continuously influencing our reactions, behaviors, and performances. The high degree of complexity of the brain, provided by the huge number of circuits between neurons, generates a virtually infinite

variability in personality. Practically no two people can be identical, not even in the case of twins. The thick touches of personality come from our genetic heritage – DNA inherited from our parents and the species' genome – but personal experience plays a crucial role as well.

The Determinism of Consciousness. Imagination, novel ideas, and even emotions arise deterministically from the complexity of neural connections. At a fundamental level, a simple decision – a binary response to known information – occurs along a specific neural circuit. There is also a form of parallel computation, a less conscious processing of input data and stored information that occurs very rapidly. This is the origin of the "sudden idea" we sometimes experience, or a decision made under what we perceive as free will. This mechanism resembles an intelligent search through a massive database, where not all entries are accessed. Alternatively, it may reflect the ripple effect of a quantum-level state transition triggered randomly in a single neuron – an event that amplifies into a wave of thousands of impulses simultaneously seeking a result. *Note on superdeterminism:* Our universe is not superdeterministic, only deterministic. For humans, this means we possess the freedom to make choices, to plan our futures, and to exercise our free will – rather than merely experiencing an illusion of such freedoms. While determinism is omnipresent, its expression across the vast dimensional range of phenomena acquires different nuances. At the microscopic level, quantum randomness affects the states of matter, providing a kind of assurance that true randomness exists. Extending this idea further, one might speculate that a neuron involved in a decision was influenced by quantum-level randomness. However, the brain provides redundant neural pathways for all processes; its decisions are therefore independent of the environmental noise, being only the product of our free thinking. Thus, life is not a global plan conceived by the universe – or by some so-called creator – one we cannot change, but just execute step-by-step indefinitely.

Self-control. Consciousness, as the highest form of human adaptation to the environment, allows for a form of "self-programming" and multi-level self-control – an internal censorship over our reflexive actions and over our own analyses. This regulatory mechanism, which also involves awareness of actions, causality, and outcomes, can surpass and dominate primal instincts in most cases. The overlap of these multilayered decision-making regions – instinctual and conscious – gives rise to internal conflicts that often lead to unexpected decisions. Moments of fear or panic are prime examples, as are cases where the fulfillment of basic needs results in unconscious actions that defy logic and reason.

Ethics. As social beings, we have developed a relatively coherent concept of "good" and "fair" applicable to groups and close communities. Consciousness facilitated the acceptance and elaboration of this concept, which, over time, incorporated behavioral norms necessary for broader coexistence. Together, these developments led to the emergence and imposition of global moral values – essentially, a social ethic.

Levels of consciousness. It is entirely plausible that higher levels of consciousness exist beyond that of the today's modern man. As previously suggested, new abilities and cognitive mechanisms may emerge in the future. By their extraordinary performance, these developments could produce an unforeseen leap in the evolution of the species known as humans.

4. Evolution and Adaptation

It took approximately 3.5 billion years for the first life forms – unicellular organisms – to evolve into the complex beings we know today. This extended period, a favorable environment, even the global extinctions, all contributed in their own way to the extraordinary "experiment" conducted in Earth's vast natural laboratory. There is now no doubt that life, once it appeared, evolved naturally and continuously adapted to its surroundings, eventually shaping an almost perfect organism: the human being. Through mental and physical capabilities, humans continue their developmental journey, striving to overcome as many limitations as possible along the way.

What has been described above may be called the *Scientific Threshold*, as it is entirely the product of scientific advancement. It represents the moment humanity fully grasps the material nature of reality along with its associated concepts and mechanisms: causality, time, space, relativity, gravity, and so on. It marks both a triumph in understanding our place in the universe and a deepened understanding of ourselves. Crossing the scientific threshold has profound and immediate implications on the mental and spiritual planes. Today, humanity holds the key to its own existence and consciousness, possessing a comprehensive representation of what life means in general. The mystery has nearly vanished, the existential struggle is over, and we can now direct our full attention toward the future.

However, the *Mental Threshold* will be far more difficult to cross. It may even require new evolutionary mutations to alter the current capacity and substrate of consciousness, as our species needs to adapt to its new informational dimension. This transformation will take time and involve pain, but the step forward must be taken as soon as possible. The time lost by humanity in religious and conflictual darkness – this enormous delay on the road to Normality – must somehow be compensated, because time now comes at a tremendous cost. How much, exactly? Precisely everything. With every second that passes, the chances of humanity's self-destruction through global conflict increase, while its chances for protection through cosmic expansion diminish.

Imagine for a moment where we might be now without those centuries of delay and error:

- The colonization of the Solar System nearly complete, with permanent human bases on Moon and Mars, and vast resources extracted from the asteroid belts.

- The first expedition to Proxima Centauri, marking humanity's first step onto an exoplanet.
- The discovery of life on another celestial body and humanity's first contact with an extraterrestrial species.

It is reasonable to assume that the transformations within human society – more or less globalized – will also be tremendously difficult. We are not talking about minor changes here and there, but a complete reordering of humanity's priorities. A new value principle must be placed at the forefront: *global mobilization* to ensure the species' medium and long-term survival.

And it is not only mentalities that must change. The structure of economies, the politics of states, and the organization of society – practically the entire model we have "worked" under until now – must be rewritten. This is not a utopian project, but a necessity, if we are to seek progress, stability, and guarantees for the future of humanity. We are an adaptable species, and we have managed to evolve under difficult conditions.

All forms of social, political, and economic organization – capitalism, communism, dictatorships, democracies, market economies, financial systems, parties, governments – have generated imbalance and injustice. They have mostly served as obstacles to progress and must be fundamentally transformed. Many structures originated from a historical chain of decisions – well or poorly implemented – made by "leaders" who never acted in the interest of each individual. Moreover, they have hindered or destroyed the natural rights and freedoms people could have in a civilized society, reinforcing divisions based on various criteria.

In many countries, social egalitarianism has been promoted, as harmful to human coexistence as extreme inequality. Today's organizational systems are outdated, inefficiently consuming both resources and time. Principles that sound admirable on paper have been wrongly applied everywhere. Intelligent and valuable individuals have been excluded from decision-making, consciences have been corrupted. The principles essential for coexistence in a limited habitat have been violated throughout entire human history.

War, deceit, theft, and murder – driven by false myths such as wealth, status, land, and power – have distorted and reversed the natural hierarchy of values. Irrational resource exploitation has depleted natural reserves, polluted the biosphere, and destroyed entire ecosystems – all in the name of a pseudo-

quality of life supposedly provided by political-economic governance, typically via the market mechanisms of demand and consumption.

It is incredible how many absurdities we must still endure as Earth's inhabitants at the dawn of the third millennium, a time when the concept of human rights is barely mentioned! Injustice persists, dictatorship is disguised as democracy and "common good", manipulation abounds, and control is omnipresent. There is much to be elaborated here. Yet these are undeniable things, which have produced more negative effects than all wars in human history combined and which fully justify the *transformation project* proposed above. This is clearly a historic moment: humanity must take a great leap forward and sever ties with its past. Evolution and adaptation now must eradicate the predator and the warrior within each of us, and we must rediscover how to coexist peacefully.

We differ in many ways, but we are social beings and must reinvent the norms and normalcy of communal life. The good news is that humanity's fate, as previously stated, lies in our own hands. The bad news is that we are still far from achieving the critical mass of global will required to make this natural leap toward civilization, rationality, and a secure future.

These lines were written in 2017... Now, in 2025, I cannot help but notice the accuracy of my initial proposals and the correctness of some ideas that, in a sense, seemed to anticipate the future! Unfortunately, in these intervening years, humanity has taken a different path, and war, murder, nationalism, and lies are experiencing an unexpected resurgence, signaling a global political regression. Instead of entering a millennium of peace on Earth, scientific progress, and cosmic exploration, we are witnessing an incredible resurrection of historical darkness, the triumphant return of imperial greed, and the overturning of democratic values for which humanity has already sacrificed too much. Major powers aim to dominate the world, international laws are disregarded, military budgets are limitless, and the initial phase of globalization is rapidly regressing into individualism. Realistically speaking, the prospects for launching a major global project for the common good of humanity have just vanished.

5. Principles and Rights

Theoretically, every human being is born free and equal to others. Yet, as one learns and understands, it becomes evident that the world does not guarantee these natural rights – instead, it discriminates or even imposes their opposites. This inequality is not due to environmental constraints or the people around us, but to the social and legal norms imposed by the larger group to which one belongs – norms that are often unwelcome, yet must be followed due to lack of alternatives. Over time, habituation sets in, reinforced by social mimicry, and individuals come to believe that this is their normal life and the maximum possible freedom.

Our genetic heritage inherently differentiates us by race, sex, ethnicity, family, and nationality, assigning us to groups with specific traits. Unfortunately, this is precisely where the nuances of "equality" begin to unravel. Modernity proclaims liberty and equality for all, even creating the concept of "human rights." However, in practice, this often becomes an empty rhetoric – useful for dulling the sensibilities of those who are genuinely concerned. Modernity also reclaims the ancient notion of "democracy" – which means that, in a certain state, power belongs to its individuals, to its ethnically and geographically differentiated people. But this too is proving to be a fantasy day by day, an idea that only theoretically sounded very good. In fact, only a pseudo-participation of individuals in the leadership of the group is ensured, all the more irrelevant the more numerous the collectivity. Even Socrates raised legitimate doubts about democracy as *an unjust and corrupt political system* – and the whole concept showed its dysfunction from the very beginning! Nevertheless, the idea has proved convenient for many regimes, which have adopted and adapted it in various forms to this day.

For hundreds of years, rulers have learned to take full advantage of this democracy, effectively maintaining their positions and privileges by exploiting a fundamentally flawed and seemingly impossible to change system. They have distorted its meaning and shamelessly exploited its weaknesses. The assumption has always been that individuals will not easily abandon the basic protection and shared advantages offered by larger groups. This primary instinct – encoded in our species' DNA – has overridden even the rational and justified revolts of those who resist the tyranny of the majority. Indeed, inventing an ideal social system still seems like an impossible mission. And this is not a subtle plea for anarchy, or for a utopian construct based on infinite freedom, but rather a simple observation of today's social reality.

What modern decision-makers clearly lack is vision; they appear paralyzed within projects that have already failed in the past. Some leaders have attempted to impose new regulations to correct evident social dysfunctions, but these quickly morphed into unbearable restrictions that actually exacerbated the problems. Individual liberty has increasingly become an empty slogan; human rights are being restricted drastically, both abusively and illegally – leading to rapid and expanding mass surveillance and *control*.

Despite the technological progress recorded by many of the world's states, the easy communication of the Internet era and the scientific advancement in all fields, politics and international relations remain seemingly stuck somewhere in the Stone Age. There is no effective global management of planetary issues, and no concerted actions to protect the natural environment. Particular interests dominate, and the fight against global warming through greenhouse gas reduction has been "forgotten". Globalization, once a promising means to optimize the economy and safeguard the ecosystem, has become an empty shell. Instead, we witness ongoing wars, arming with astronomical budgets, crimes, and destruction – it seems humanity is preparing in earnest to destroy itself.

What is missing is a global project – a plan to stabilize the planet, secure peace, and establish lasting balance. It appears that many have become resigned to this status quo, blind to and uninterested in alternatives. A kind of endless Stockholm syndrome diminishes their will, leading them to tolerate a visionless ruling minority. This subtle yet global alienation overshadows and nearly extinguishes the progressive and authentic spirit of modern humanity.

If we compare today's technological progress to the average standard of living, a stark imbalance emerges – one that demands immediate global corrective measures. In my opinion, at least two centuries will be needed for any significant change. But what, concretely, must be done for every human being – regardless of his country – to benefit from this progress?

- First, there must be a fair and optimal allocation of the planet's resources; a complete renunciation of militarization, armies, and armed forces, redirecting those budgets toward scientific research. For example, into medicine, efficient agriculture, robotics, and space exploration. We must be prepared to face new challenges: epidemics, earthquakes, volcanic and solar eruptions, extreme weather events, melting polar ice caps, asteroids, and cosmic radiation. Now is the time for global planning and cooperation.

- Second, there must be a gradual optimization of the global population's distribution to ensure everyone a decent standard of living and proper health conditions. Educational systems must be standardized, streamlined, and immediately adapted to new demands.
- The third change must occur in our mindset – we must move beyond the previously mentioned threshold. Traditional and cryptocurrency-based money systems must be gradually eliminated, as they reflect no absolute value and in fact destabilize market equilibrium. Today's financial systems function as ineffective and corrupt empires, facilitating money laundering and speculation with political complicity. Similarly, the political system – parties and leaders of all kinds – must become obsolete. Only experts should make decisions on economic and social matters. All people must understand and contribute to this new collective project, dismantling the current "value-system". Society will undergo a fundamental transformation; the very notions of property and state will evolve. We will respect the human rights, collaborate globally, and protect nature. Technology, robots, and AI will do the "work" for us, while we design a better future and live normal lives. The decline of ideologies and religions is equally predictable and utterly necessary. These principles must extend and adapt to future interplanetary migrations, where the challenges of living in confined spaces will be even greater.

This new project must begin urgently – the potential decline or annihilation of the human race must be halted, along with environmental degradation and the worsening quality of life. I hope we do not pass a critical point beyond which there is no return.

It is evident that a change in mindset will trigger profound societal transformations. Social life will adapt to a decent coexistence based on respect, tolerance, and shared purpose, where each individual contributes consciously to the community's well-being. While we cannot describe in detail this new social model, it can be simply outlined as a project derived from the word *NORMALITY*.

We have already paid the tribute caused by the animal hidden in us and by our initial ignorance. The fighting must end. We have found all the explanations for the so-called elements of nature (fire, water, air and earth), now we know who we are and where we are heading. The answers to all fundamental questions have been given. The fantasy of the existence of a creator is no longer of any use, as it has never actually was. It is time for the mystical-religious delirium, whatever forms it still may have, to disappear

definitively. The harm done over millennia by various religions and by their followers, out of thirst for "power" or stupidity, the manipulation, the crimes they committed in the name of "faith", all will be overshadowed by the light of purely scientific knowledge and by the full recourse to reason. Humanity's dark period must end right now, and the hierarchy of value must be restored. A new destiny for humanity, planned by our rational nature, must prevail.

However, the material aspects of implementing this new normal must not be ignored. The era we are currently living in, with its technological, informational, and scientific advancements, places us at the threshold of a new frontier: one in which machines created by humans can meet all our basic needs, and even provide additional comfort. The machine must no longer be viewed as a threat, but as a vital and necessary ally. We build these machines, endow them with intelligence, and enable them to communicate. We are responsible for their programming, control, autonomy, and decision-making levels. The AI-powered machine represents not only a hope but a necessity for securing the future of humanity – even if it will bring about profound changes across all domains. Moreover, the machine's complexity, intelligence, and speed make it indispensable in our path toward interplanetary travel. Only these AI-powered machines will be capable of managing the immense array of variables associated with these missions, greatly increasing our chances of success. The redundancy gained by supplementing human actions and decisions with immense computational power provides the safety and support required for any future cosmic endeavor.

6. The Philosophy of Good and Evil

Good, like *evil*, belongs to those abstract concepts whose nature is essentially relative. Even the notion of *normal* falls into this category, as it is subject to a multitude of interpretations and nuances. However, there is an element of absolute nature hidden within these terms – something that allows for the unveiling of their true meaning within the broader context of human life and existence.

As previously stated – and as will be further illustrated – evil has left a profound mark on human history. But why focus on evil alone? Because good, which is inherently linked to normal, represents the opposite of nearly everything humanity has done so far. And no particular philosophical doctrine is necessary to advance this discussion. A path grounded in scientific inquiry, logic, and rationality is, in my view, precisely what humankind must follow as a species that has recently begun to comprehend the nature of reality.

The foundational principles from which we should start spring directly from the undeniable materiality of the world and can only be formulated through a fully scientific approach. However, these principles must be considered along with an a priori validation of the cognitive journey required to reach this point. As it was postulated in the introduction to the Prime Theory [1], knowledge is perfectly possible for modern human and is only restricted by the limitations of the physical world. Moreover, knowledge is also absolutely necessary, it helps us to correctly define the framework where we operate with all these principles.

The balance of our species' actions throughout history shows a huge level of negativity, if we were to speak metaphorically. And this assessment not only include the scars left by millions of years of inter-species struggle, the one that finally brought humans to the top of the food chain, but also the more recent consequences of the intra-species violence. Nevertheless, the historical accumulation of evil can be quickly reversed if we start right now the *Project for Humanity*. The first and most important step in this project is to fully de-relativize the concept of good: *Good can be defined as the quality of actions that ensure the survival and flourishing of the human species as a whole, promoting peaceful growth and development to cosmic scales.*

Subsequently, a set of principles must be developed to redefine humanity's place and role in the universe, thereby providing coherent meaning to future human actions. To this end, we should begin by drawing lessons from

the past and considering what can be done in the present to secure optimal conditions for future generations. We must no longer be dominated by our primal instincts, mysticism, or pseudo-ideologies; instead, we can adopt a remarkably simple philosophy of normalcy. The transformative leap must begin with the global understanding of this general purpose and its embodiment in the daily lives of individuals. The dissemination of this concept across generations should be natural and unforced – merely the result of a growing awareness of a global necessity, of a "greater good" represented by the preservation and evolution of our species. This paradigm shift will affect our existence at its core and, as such, will not be easy.

It took many years for our planet to become habitable, many for the first living organism to emerge, many for primates to evolve into modern human. Once life appeared, it triggered an internal *mechanism* through which it grows and adapts autonomously. But what must humans do now to ensure this mechanism will continue to function? A step forward in this direction would be for modern human to transform himself into a traveler, an explorer of the galaxy. But can human take this step while his internal conflict remains unresolved? As this conflict is well understood, all we have to do now is to render it completely inactive. Once this is achieved, our progressive inner essences will surface and, in time, become dominant. Although the goal may appear abstract, it transcends all immediate interests. This is not an artificially imposed evolution driven by the allure of a utopia; rather, it seems that crossing this threshold – perhaps over multiple generations – is the natural path forward in transforming today's human into a *normal* human.

To avoid extinction through self-conflict.
To honor the infinitesimal chances that led to the emergence of life.
To acknowledge the vast temporal scale of evolution that followed.

But does humanity deserve a future?

Considering the exceedingly improbable chain of events that gave rise to life and enabled its development, my answer is a simple "yes." The uniqueness of this cosmic and planetary sequence possesses immense intrinsic value, which all humans must respect. We can do so by implementing the global transformation outlined above – an imperative step toward transitioning from a terrestrial to, potentially, a galactic civilization. We now understand that the "spark" animating us as sentient beings is merely an ephemeral flicker of stardust. With that realization comes humanity's profound duty to keep that flame alive for as long as possible.

What laws should humans follow?

Isaac Asimov [17] formulated the basic laws of robotics in 1942, thereby establishing a logical framework for limiting the autonomy of entities endowed with artificial intelligence. Once implemented, this framework guarantees that these machines – created to assist us – will never be able to cause us harm. In other words, it becomes possible to establish behavioral norms to govern any conceivable human-machine interaction. The preconceived idea that such a robot might one day acquire a form of consciousness and seek to eliminate its "competition" – namely, the human who created it – will not be further considered. Here are the original set of four laws that should regulate the entire behavioral spectrum of autonomous robots:

- **Law 0:** A robot may not harm humanity, or by inaction, allow humanity to come to harm.
- **Law 1:** A robot may not injure a human being or, through inaction, allow a human being to come to harm, except when required to do so in order to prevent greater harm to humanity itself.
- **Law 2:** A robot must obey any orders given to it by human beings, except where such orders would conflict with the First Law or cause greater harm to humanity itself.
- **Law 3:** A robot must protect its own existence as long as such protection does not conflict with the preceding laws or cause greater harm to humanity itself.

These are a natural extension of the laws that even humans themselves ought to follow in the name of the common good, grounded in their conscience and their ethical framework. In this spirit, I propose three *fundamental laws for humanity*, to be applied and upheld from this point forward:

1. A human being may not harm another human being (or humanity as a whole), nor, through inaction, allow harm to come to another human being (or humanity).
2. A human being may communicate, collaborate, and work with other people, so long as such actions do not conflict with the First Law.
3. A human being must safeguard and improve their own existence and natural environment, using all that science and technology provide; they have the duty to learn, discover, invent, research, and explore, so long as this does not conflict with the First Law.

This minimal set of laws must be expanded as humanity evolves in a cosmic context – particularly in the case of contact with an advanced extraterrestrial civilization in the future.

Is an Exodus Toward Other Planets Necessary?

Absolutely. Such an exodus is not only necessary, but it must include multiple destinations. We need new resources, we need territorial security, and we need to explore the unknown. The expansion of human presence into various planetary systems is a natural step – but it must be done with respect for other life forms or civilizations we may encounter.

But What Has Hindered a Faster Development?

Human progress has been remarkable, especially over the past two centuries. We have harnessed coal and oil, we have built, we now communicate and travel rapidly. Yet this progress could have been much faster, despite certain social and economic inefficiencies, but there was an obscure force that has obstinately resisted every form of advancement.

The generic term "church" will be further used to denote all sorts of organizations, institutional or not, which spread "religion" through an elaborate scheme involving mass deception. They actually sell some pseudo-moralizing stories centered on one or more deities, on a divine creator of the world, used across millennia to control and exploit the less informed people. Many have embraced this fabrication as a supreme truth that must simply be believed, not examined or proven. Over time, the church succeeded in imposing "faith" as the sole means of knowing, indoctrinating a large portion of the population, distorting individual conscience, and delaying human progress by centuries. The promotion of absurd narratives about the origin of life – particularly intelligent life – the imposition of a so-called moral code derived from alleged sacred texts, the artificial division of people into believers and non-believers, along with the punishment of the latter – all of this has sustained a *criminal mechanism* that has operated in various forms for about two thousand years. Its impact on humanity, regardless of historical period or location, has been catastrophic.

Presented as a "spiritual" thing, this "faith" mechanism is a concept full of pseudo-explanations that targets a sensitive area (still dominated by some mystery) of our conscience. It has exacerbated the primal instincts of humans and alienated them gradually, paralyzing and annihilating their natural appetite for knowledge and rational explanations. There may be a justification for that, it

may have been normal in the early days of human civilization, when fire and the falling stars were not yet understood. Maybe it was normal then, for about five minutes. Unfortunately, these pseudo-ideas were spread rapidly; the church's institutions have strengthened and even tried to suppress the scientific "opposition". And there were many followers willing to continue this criminal scenario, while most politicians took advantage of this opportunity and let the church thrive. Seneca himself might have said: "*Religion is regarded by the common people as true, by the wise as false, and by rulers as useful".* Anyway, this church business has turned into the ugliest affair of global dominance and control in human's history, and does not seem to fade fast enough at the dawn of the third millennium. Power and wealth are irresistibly attractive, they corrupt absolutely, and in their name a spiritual crime of unforgivable magnitude continues to unfold. Even today, many people are still deprived – sometimes subtly, sometimes directly – of full intellectual freedom. Indeed, humans were violent creatures, territorial and possessive, willing to take advantage of the others. But many years have passed and this kind of struggle should be long gone from our personality. Humans turned civilized at some point and this had to change them, to affect them deeper, up to the genetic level; only a few generations later, they must have become normal and balanced beings, living in peace and working for the common welfare.

The blend of extremes within "human nature" – love and hatred, aggression and understanding, possessiveness and generosity – may have been progressive in an early phase. Yet the internal antagonism should have diminished over time, and the proportion of individuals driven by negative primal instincts should have significantly decreased as a result of natural selection. If we were to highlight the "benefits" brought by religious institutions to human civilization, we could use just one sentence to grasp the full magnitude of the issue: a *substantial delay in the progress of human civilization* – in other words, a global regression measurable in *centuries*.

Where Could We Have Been by Now?

At the very least, science would be far more advanced across all domains. Humans would likely have completed the exploration of the solar system and may have already established a new generation on another planet.

These religious organizations have done serious harm to humanity in general, and their evil influence will be very difficult to repair. They show, like politics, a negative side of the idea of group, leader and social structure – through which authority and power can be abused. Unfortunately, taking

advantage of the so-called freedom of belief – that subscribes to the general concept of freedom in modern times – these organizations will likely continue to control large segments of the population for many years to come...

Will Good Ultimately Prevail?

Many scientists, through their lifelong work, have managed to reduce much of the delay described above. Over the past few centuries, geniuses such as Darwin, Newton, and Einstein have demonstrated the true power of human intellect and knowledge – how it can enlighten our lives and aid our progress. They have proven the material nature of the world around us and uncovered the laws that govern it. They have shown the natural origins and evolution of living beings, solving many of the mysteries that had troubled humanity for millennia. The "blindness" caused by creationist myths has now come to an end. The scientific era of *good* has begun, and people must embrace it – not only to advance their own species, but also to protect the planetary environment with which they live in symbiosis. The positive and tolerant aspects of human nature will break free from the prison of history, making humans to grow together in *normality*. Today, as an intelligent species, we find ourselves at a pivotal point on the scale of our development. To move beyond this difficult stage, all we need to do is *reconsider life and its value* – as it was already stated in my proposal. Moreover, our cosmic dimension cannot be exploited without solving, once and for all, our inner and outer conflicts. Under no circumstances should we carry those conflicts with us as we venture into space.

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It was a very long journey... It all started with the granular fluid and its special mechanics, with those hydrogen atoms that filled the space about 14 billion years ago. Then the first stars ignited, and many other chemical elements were forged inside their hot cores. At the end of their lives, some stars went novae and threw all their matter into space; this gave rise to cosmic dust – which later coalesced into new stars, planets, and moons. At the edge of a regular galaxy, on a small planet called Earth, a few complex molecules have joined together and formed the first living cell. Another cosmic blink, about 4 billion years, and those primordial organisms evolved into humans. These are self-destructive, yet intelligent and full of curiosity beings. They took a small step on the Moon, and soon they will set foot on another planet in their solar system, Mars. But could they travel even farther, on the way to the starlight, leaving behind all their inner contradictions and becoming a normal, real cosmic civilization?

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