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HERMES



Scientific cosmology and ancestral cosmogony:
A dialogue on the origin of the cosmos

The complexity of place and non-place:
The resignification of space in supermodernity

Biomimetics for the study of autopoietic systems in nature

Tribute Dossier:
Edgar Morín

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Statue of 'Hermes Kriophoros' at the Warburg Institute in London – photo taken by Tiago Grandi.

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Editorial

by Fernando Schwarz



El On May 29, 2026, the French philosopher and sociologist Edgar Morin passed away at the age of 104. He was one of the pioneers of complexity theory, which has changed the way we view the world and ourselves.

He explained that any change, any metamorphosis, could not occur without a metamorphosis of the human being itself: "It is not enough to resist external barbarism, the cruelty and hatred coming from the depths of historical time, combined with the icy barbarism of calculation and technology that tend to impose themselves on our society; we must resist the barbarism we carry within each of us."

For Morin, the attitude to be cultivated is that of practicing "a true psychic culture that includes self-examination and self-criticism, resistance to the egocentric tendency to justify oneself and to discharge evil onto others."

One of Edgar Morin's main avenues of research early in his work was related to the great myth of death. For him, the problem of death is an essential key to understanding humanization and one of humanity's great

topics. I believe this essential reflection led him to realize that we could not give answers that were neither generalist nor simplistic, and that we had to integrate contradiction into the answers; the notion of complexity is a fundamental approach to being able to respond.

Edgar Morin understood very early on that we currently live in a systemic crisis, because it is simultaneously political, economic, cultural, social, ecological, and, above all, human.

In an article published in 2024, he points out that thought has become blind and that the climate of violence, uncertainty, and the feeling of a lack of future prevents us from thinking about the whole picture: "The progress of knowledge is incapable of conceiving the complexity of reality and, in particular, of human realities. This leads to a regression into dogmatism and fanaticism, as well as a moral crisis driven by the rise of hatred and idolatry."

It seems necessary to us, as it did to Edgar Morin, for the human being to return to the center of social development and a "policy of civilization" that unites people beyond their diversity. ■



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HERMES AND THE HUMAN BAT

Ana María S.
Translation Marek Grote

INTRODUCTION

This article will explore the plasticity of the god Hermes, a characteristic that allows us to delve into the magical world of the bat-human in Tayrona culture—a human capable of transforming into this animal and acquiring its traits to communicate with the spiritual world, due to his psychopompic nature. In the Tayrona worldview, the human bat is "a terrestrial human being capable of traveling to the Underworld, due to his bat-like attributes, and to the Upperworld, due to the birds that accompany him" (Plazas, 2018, p. 78). We can also observe this psychopompic characteristic, among others, in the myth of Persephone, where Hermes descends into the Underworld as a mediator to facilitate the maiden's return to the earth. "Hermes—Hades with cerulean hair, who reigns over the dead! Father Zeus commands me to bring the glorious Persephone out of Erebus and take her to them; so that her mother, seeing her with her own eyes, may lay aside her wrath and terrible anger against the immortals." (Homer. Line 347). "Hermes the psychopomp, according to the expression of Henderson, a disciple of Jung, penetrates from the known world into the unknown world in search of a spiritual message of liberation and healing." (Chevalier, 1969, p. 340).

Research using the comparative method allows us to explore the universal symbolism of the god Hermes, bearing in mind that "all these figures of the god are related to the idea of hermetic transmission, which seeks to ensure the perpetuity of primordial initiatory knowledge, transmitted by the Word (Logos) of Hermes to those philosophers or adepts who, through various practices, perpetuate the spirit." (Schwarz, SF, p. 25). Within this symbolic framework, and drawing on one of the three principles of the school of philosophy (New Acropolis, 2026)—comparative study—we propose to draw a parallel between the figure of the god Hermes and the human bat of the Tairona culture. To this end, we will draw on the anthropological work by Dr. Clemencia Plazas titled *The Human-Bat in the Northern Intermediate Area*; this study, from an archaeological perspective, uses gold and silver artifacts to support the Tayrona culture's worldview regarding the human-bat. Its most representative pieces are housed at the Gold Museum in Bogotá, Colombia.

Let the concept of the "bat-human" thus serve as a starting point and symbolic key to fostering an understanding of the esoteric nature of the traditions of the indigenous peoples of pre-Columbian America. We have used ChatGPT 2026 (OpenAI) to generate the images illustrating this text.

THE BAT-HUMAN

1. Location:

The figure of the human bat can be found in various settings across pre-Columbian America. In particular, there are archaeological finds from Copán in Honduras, the Greater Nicoya region in Costa Rica, Colombia (the Tayrona and Muisca cultures), excavations in Manabí and Esmeraldas in Ecuador, and the Mochica culture in Peru; archaeological sites from which jade artifacts, ceramics, pectorals, and goldsmithing pieces featuring the human bat figure have been recovered, suggesting that this anthropozoomorphic figure was an icon of the Amerindian peoples, with similar characteristics and traits present in their thought systems and ritual practices.

And despite various anthropological debates regarding the regional classification of Amerindian cultures, Professor Clemencia Plazas proposes "an Intermediate Area extending from eastern Honduras to the northern coast of Peru, including the Venezuelan Andes." This broad cultural region would be divided into two major subregions: the Northern Intermediate Area, whose southern border lies south of the Quimbaya and Tolima archaeological sites in Colombia, and the Southern Intermediate Area,

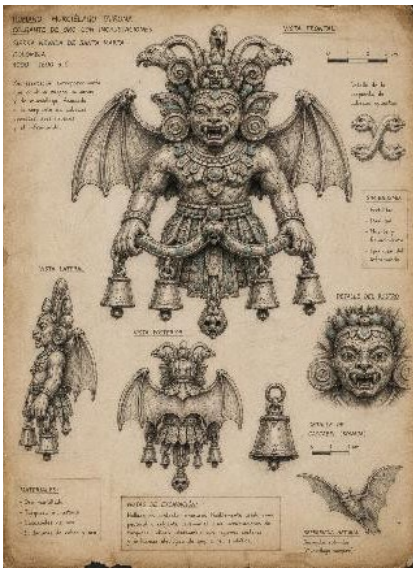
which encompasses southwestern Colombia, Ecuador, and the northern coast of Peru" (Plazas, 2018, p. 17).

However, the study area proposed by Professor Plazas to understand the imagery of the Tairona culture in relation to the bat-man is the Northern Intermediate Area of Colombia, a region that "encompasses the material studied here very well and reflects, through the presence of the same icon and its treatment, features of a shared worldview" (Plazas, 2018, p. 17). For her study of the bat-man, Professor Plazas systematized information from 9,740 pieces of Tairona gold, finding that the human-animal figure is the most representative, since, according to her statistical data: "with regard to the transformation of humans into animals, it is striking to observe that the only anthropozoomorphic representation in Tairona goldwork is that of the human-bat, a fact that demonstrates its importance within their imagery." (Plazas, 2018, p. 53).

Dr. Plazas's proposal allows us to study the human-bat figure through the elements that are common to it, related to it, and that give it a unique character. Thus, archaeological findings have dated depictions of the bat to: "pottery made with plant-fiber slip (5000–3000 BCE) and Malambo pottery (1200–700 BCE). During this formative period of pottery, the icon does not display the mixture of anthropozoomorphic features common in the later Tairona period" (Plazas, 2007, pp. 34–35). And "Although Tairona-style goldwork dates back to 1000 CE, most of the gold pendants depicting the human-bat can be dated to between 1400 and 1600 CE; dates corresponding to the Tairona II period" (Plazas 2018, p. 43). The most representative examples of the bat-man can be found at the Gold Museum in Bogotá, Colombia.

2. The Plasticity of the Bat Man: A Symbolic Key

According to Professor Plazas, "specifically, the bat—the subject of this study—participates in primordial acts of creation and, through its presence in ritual and myth, reminds the indigenous people of the Sierra of its role as a bringer of fertility to the universe in general and to women in particular" (Plazas 2018, p. 20).



Fuente: Inspirado en el libro Humano murciélago de la Dra. Clemencia Plazas [generador de imágenes de IA]. Creado por OpenAI usando prompt propio, mediante ChatGPT.

However, this mode of thought—or integration into the symbolic world—was severed at the dawn of modernity; in this regard, Levi-Strauss points out: "The break, the actual separation between science and what we might call mythological thought […] took place during the seventeenth and eighteenth centuries. At that time, with Bacon, Descartes, Newton, and others, science needed to assert itself and stand firm against the older generations of mystical and mythical thought; it was believed then that science could only exist if it turned its back on the world of the senses—the world we see, smell, taste, and perceive" (Strauss 1977, p. 26).

This is why the new anthropological



Fuente: Inspirado en el libro *Humano murciélago de la Dra. Clemencia Plazas* [generador de imágenes de IA]. Creado por OpenAI usando prompt propio, mediante ChatGPT.

vision has gained such relevance: it proposes a perspective rooted in religious or symbolic anthropology, develops the concept of the sacred, and is studied in Europe's centers of thought. Under this new paradigm, we delve into the figure of the "bat-human" in Tairona culture, whose ritual system already contained meanings that allow us to intuit notions of the underworld. For Eliade, these are nothing more than "mythical ritual complexes in which death and rebirth interpenetrate, becoming distinct moments of the same transhuman reality" (Eliade, 1972, p. 320).

In the depiction of the human bat, we find that "its limbs and face are depicted as fleshless on the rattles, and when it is seated atop the bird heads of the winged pectoral ornaments" (Plazas, 2017, p. 78). This description creates an iconographic association unprecedented in Tairona goldsmithing, revealing this culture's vision of the underworld. At the same time, the figure of the bat-man—a creature of the night that dwells in caves—is unsettling, and no pre-Columbian culture expresses the human-animal symbiosis better than the Tairona culture. "The blending of human and animal traits finds its highest expression in Tairona gold, as their ornaments—nose rings, ear rings, and visors—make the wearer resemble a bat or a jaguar, or transform the human into a bird or a snake through the sublabial ornament" (Plazas 2022, 48).

3. Hermes and the Bat-Man

These goldwork figures have revealed a series of anthropozoomorphic figures that embody a symbiosis between humans and bats. Furthermore, their iconography has provided a set of attributes that allow us to propose the following comparison:

CHARACTERISTIC	HERMES	HUMAN - BAT
Related Sacred Space	The sacred space associated with Hermes is the cave, or the heart of the mountain; this cave acts as a womb, a place where the invisible is revealed	«Caves, as the natural habitat of bats, symbolize the grotto or place of darkness, where he can operate in both the sensible world and the invisible world. Kogui myths "place him in dark habitats—deep caves or the interior of the kansamaría—and describe him as an anomalous figure belonging to the Underworld." (Plazas, 2017, p. 177) (Plazas, 2017, p. 177)
The Expected and Unexpected Mediator	Hermes is the one who travels the roads. Located at the crossroads, in the form of a two- or four-headed herma, he marks the directions and delineates the routes.	«In the stories, they are found in transitional places, such as street corners or crossroads; they are active at night or during the twilight hours. Like the dead, there is something cold about them: their face or their limbs" (Blaffer 1972, p. 68). "He is an earthly human being capable of traveling to the Underworld, due to his bat-like attributes, and to the Upper World, due to the birds that accompany him» (Plazas, 2017, p. 77)

CHARACTERISTIC	HERMES	HUMAN - BAT
Role	Funeral, as protectors of the posts and guardians of the gates that connect the visible and the invisible.	«Gold and winged Tairona stone pendants depicting bats were buried alongside stone beads, axes, and monolithic staffs inside globular or cylindrical ceramic vessels with lids... These multiple offerings, or 'caches,' can be found alone or in funerary contexts, either accompanying funerary urns in secondary burials or in primary burials in direct graves covered with stone slabs» (Plazas, 2017, p. 42).
Ouroboros	The serpent whose head (consciousness—good) swallows its tail (consciousness—evil). With its head facing both right and left, it presides over the union of heaven and earth, the reconciliation of angels and demons, and male—phallic—and female—chthonic—sexuality.	Just as the "priest" on his throne or seat of power, it also represents the axis mundi or axis of knowledge. In this case, the central figure and his attendants appear atop a bird with its tail spread, indicating its power of transcendence across the various worlds. (Plazas, 2017, p. 78).  Source: Inspired by the book *Humano murciélago* by Dr. Clemencia Plazas, p. 248 [AI image generator]. Created by OpenAI using a custom prompt via ChatGPT

CHARACTERISTIC	HERMES	HUMAN - BAT
Music	Nothing expresses the clarity and, at the same time, the nocturnal reserve, charm, and delicacy found in Hermes better than the magical, sweet sound of strings or the flute	The association of the human-bat with sound—evident in its presence on numerous bells and bells made of precious metals, as well as in stone in the form of possible hanging rattling plaques (Chapter 6)—is confirmed by the existence of several pendants in which the figure plays a musical instrument, possibly a flute. (Plazas, 2017, p. 78)
Female	Iris appears with wings and, when not, with the symbol of travel, Hermes' caduceus.	In late gold depictions (1000–1600 CE), in addition to those already mentioned, the dual figure of a man-bat and a woman-bat is observed, as if they were twins. (Plazas, 2017, p. 113)



*Source: Inspired by the book *Humano murciélago* by Dr. Clemencia Plazas, p. 241 [AI image generator]. Created by OpenAI using a custom prompt via ChatGPT.*



*Source: Inspired by the book *Humano murciélago* by Dr. Clemencia Plazas, p. 295 [AI image generator]. Created by OpenAI using a custom prompt via ChatGPT.*

CONCLUSION

The symbolic construction of the figure of the bat-man in Tairona culture has made it possible to draw parallels with the figure of the god Hermes, as a traveler between the celestial world, the earthly world, and the underworld. Furthermore, archaeological findings in the field of metalwork, combined with the work of symbolic anthropology, have facilitated the interrelation between the characteristics of the god Hermes and those of the human bat, as well as the archaeological discoveries in northern Colombia. This reveals a ritual system that is not exclusive to this culture but rather shares universal symbolic elements.

Finally, in addition to appreciating the beauty of the iconography in metalwork, the use of fire in the creation of these goldsmithing pieces is particularly striking. Regarding work with metallurgy, Mircea Eliade tells us that "this is why the most archaic cultures imagine the specialist in the sacred—the shaman, the medicine man, the magician—as a 'lord of fire.' Primitive magic and shamanism imply 'mastery of fire.' (Eliade 1994, 72). This mastery of fire, or passing through fire, as an alchemical and transmuting principle, reminds us of the universality of the symbol, where fire, in the Hermetic tradition, signifies the power of the imagination—a characteristic specific to humanity; the imagination as that world where harmony is achieved through the opposition of opposites, thereby seeking a return to Unity.



*Source: Inspired by the book *Humano murciélago* by Dr. Clemencia Plazas. p. 239 [AI image generator]. Created by OpenAI using a custom prompt via ChatGPT.*

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SCIENTIFIC COSMOLOGY AND ANCESTRAL COSMOGONY:

A DIALOGUE ON THE ORIGIN OF THE COSMOS

Jorge Ignacio Suárez Correa - Colombia

INTRODUCTION

The problem of the origin of the universe has accompanied humanity from the first moments of reflective consciousness. Far from being an exclusive question of modern science, the question of the birth of the cosmos runs through the cultural, religious, and philosophical history of all human civilizations. At present, this question has acquired a precise technical formulation within the framework of physical cosmology; however, its ontological and symbolic core remains deeply linked to the ancient visions of the cosmos. The purpose of this document is to establish a rigorous, comparative and narrative dialogue between the most relevant and widely accepted scientific models on the origin of the universe and a selection of ancestral cosmogonic stories that have had an important impact on Western thought From the scientific point of view, four theoretical frameworks have been chosen that represent the most significant and discussed developments in contemporary cosmology:

1. The big bang with inflation, as a standard model of the historical origin of space-time.
2. The cyclical universe and the Big Bounce, as proposals that rethink the origin in terms of rhythm and recurrence.
3. The inflationary multiverse, as a radical extension of the concept of cosmos and origin.
4. Quantum cosmology and the emerging universe, as an approach to the origin understood as an ontological threshold and birth of time.

These models have been selected for their scientific relevance, their sustained presence in the specialized literature and their explanatory capacity within the current framework of theoretical and observational physics.

In parallel, four ancestral cosmogonic traditions have been chosen that represent fundamental nuclei of the symbolic knowledge of humanity:

- Greek cosmogony, through Hesiod's Theogony, as one of the fundamental pillars of Greek mythology and Greco-Roman thought.
- Egyptian cosmogony, particularly the Ennead of Heliopolis, as one of the oldest and most systematic formulations of the origin of the cosmic order.
- The Mayan cosmogony, expressed in the Popol Vuh, as an outstanding example of Mesoamerican thought on creation and time.
- The Kogi worldview, belonging to one of the living indigenous organizations, whose cultural continuity allows direct access to a still current ancestral understanding of origin, balance and cosmic experience.

The inclusion of the Kogui does not respond to a marginal ethnographic interest, but to the conviction that their worldview constitutes one of the most complete and active expressions of contemporary indigenous cosmogonic thought and is part of the most important heritage of Colombia, where the origin of the world is not a story of the past, but an operating reality that demands balance and a timeless look.

This paper does not seek to reduce myths to primitive scientific explanations, nor to turn science into a form of modern myth. His intention is to show that both discourses - the scientific and the cosmogonic - address the same fundamental problems from different languages, but with surprisingly convergent narrative, ontological and symbolic structures.

The underlying hypothesis that guides this work is that ancestral cultures had a deep understanding, not technical but structural, of issues that reappear today in scientific cosmology: the emergence of order, the relationship between form and background, the nature of time, cyclicity, the multiplicity of worlds and the non-absolute character of origin. The text that follows develops this hypothesis without forcing equivalences, respecting the specificity of each language, and proposing an honest comparative dialogue, where science illuminates the mechanisms and myth illuminates the meaning.

CHAPTER I

THE BIG BANG WITH INFLATION

The Origin of the Universe as the Historical Beginning of Spacetime and Its Dialogue with Ancestral Worldviews

1. The Scientific Narrative of the Big Bang with Inflation

Contemporary physical cosmology describes the observable universe as a dynamic, expanding system. This statement is not a metaphysical speculation, but rather the result of multiple converging observations: the redshift of galaxies, the large-scale distribution of matter, and, most decisively, the existence of the cosmic microwave background. By mathematically extrapolating this expansion backward in time, using the equations of general relativity, we arrive at a state in which the density and temperature of the universe increase to extreme levels. This limit is known as the Big Bang.

It is essential to clarify that the Big Bang does not describe an explosion occurring at a single point in space, as colloquial language often suggests. It describes something far more radical: the expansion of space itself. There was neither a center nor an exterior; all of space was contained within that initial state. The Big Bang, strictly speaking, is the beginning of the physical history of spacetime as it can be described by our current theories.

In the first moments following this beginning, the universe was in a state that can be described as pre-structural. There were no stable particles, no atoms, no nuclei, and not even a clear distinction between the fundamental forces. The universe was dominated by highly symmetric quantum fields in thermal equilibrium, where the ordinary notions of "object," "distance," or "duration" lack the meaning they have in everyday experience.

Following this early state, many

cosmological models incorporate a phase known as cosmic inflation. According to this hypothesis, a tiny fraction of a second after the onset of classical expansion, the universe underwent a period of accelerated, exponential expansion, driven by a form of energy associated with a scalar field. Inflation is not introduced as a theoretical embellishment, but rather to explain very specific properties of the observable universe: its extraordinary homogeneity, its large-scale isotropy, and its nearly flat geometry.

During inflation, microscopic regions of space were stretched to cosmological scales. The tiny quantum fluctuations that are inevitable in any physical field were "frozen" into the structure of space, becoming minute variations in density. Much later, these variations would become the seeds of galaxies, clusters, and superclusters. Inflation, therefore, does not create these structures directly, but it establishes the initial conditions that make cosmic complexity possible.

At the end of inflation, the energy associated with the inflationary field transformed into a hot plasma of elementary particles in a process known as reheating. From this point on, the universe can be described as a thermodynamic system that is expanding and gradually cooling. In the first few seconds, fundamental interactions began to decouple; in the first few minutes, primordial nucleosynthesis took place, during which protons and neutrons combined to form the nuclei of hydrogen, helium, and small amounts of lithium. The proportions of these elements observed today match theoretical predictions remarkably well, constituting one of the model's most robust empirical confirmations. Over the next hundreds of thousands of years, the universe remained ionized and opaque to radiation. Photons and electrons constantly interacted, preventing light from traveling freely. Only when the temperature dropped sufficiently - approximately 380,000 years after the Big Bang - were electrons able to combine with nuclei to form neutral atoms. This process, known as recombination, allowed radiation to decouple from matter. That radiation, cooled by the expansion of space, persists today as the cosmic microwave background - a true fossil record of the early universe.

Subsequently, the universe entered a long phase of "darkness," in which neither stars nor galaxies yet existed. Under the influence of gravity, small density inhomogeneities slowly grew until they collapsed into the first luminous structures. With the birth of stars and galaxies, the universe became "readable": a cosmic history rich in complexity, chemistry, life, and consciousness began.

From the perspective of the philosophy of science, the Big Bang with inflation does not seek to explain the ultimate origin of being, but rather the beginning of describable physical history. The initial singularity is not a physical event in strict sense, but rather an indicator of the limits of our current theories. Beyond that threshold, the language of classical physics ceases to be applicable, and a yet-to-be-completed theory of quantum gravity is required. This acknowledgment of the limit does not weaken the model; on the contrary, it constitutes one of its greatest epistemological strengths.

This document was built based on the views of the main researchers on the subject: Georges Lemaître, considered the father of the theory of the expanding universe and the hypothesis of the primordial atom, developed in The Beginning of the World from the Point of View of Quantum Theory (1931) and A Homogeneous Universe of Constant Mass and Increasing Radius (1927); George Gamow, who consolidated the theory of primordial nucleosynthesis in The Creation of the Universe (1952) and in the article The Origin of Chemical Elements (1948); Steven Weinberg, whose work The First Three Minutes (1977) became a reference for understanding the evolution of the primitive universe and was later complemented with Cosmology (2008); and Alan Guth, creator of the inflationary theory, exposed in the article Inflationary Universe: A Possible Solution to the Horizon and Flatness Problems (1981) and extensively developed in The Inflationary Universe (1997).

"If the world began with a single quantum, the concepts of space

and time would be completely meaningless at the beginning"[1].

George Gamow's main idea is that the early universe was a laboratory where the first chemical elements were formed through nuclear processes[2] and Alan Guth's theory is that inflation explains why the universe is so homogeneous, flat, and structured on a large scale[3].

2. A General Narrative Dialogue with Ancient Worldviews

When we take a broad view of the scientific account of the Big Bang, it becomes evident that its narrative structure is not unlike humanity's great cosmogonies. All of them begin by describing a state prior to the world as we know it: a state without form, without differentiation, without human time. It is not absolute nothingness, but rather an undifferentiated fullness, a background in which everything is contained without being separated.

Science describes this initial state as a hot, homogeneous plasma; myths describe it as primordial waters, silence, darkness, or unmanifested thought. The language changes, but the structural intuition is strikingly similar: the world does not arise from nothing, but from a condition preceding order.

Furthermore, in both science and myth, the origin is not an instantaneous, completed act. It is a process. The world gradually organizes itself through separations, transitions, and emergences. Science speaks of symmetry-breaking and decoupling; cosmogonies speak of the separation of heaven and earth, the emergence of light, and the establishment of order. In both cases, the cosmos appears as something that comes into being, not as something that simply appears complete.

3. The Big Bang and the Heliopolitan Ennead

The Heliopolitan cosmogony begins with Nun, the primordial ocean. Nun is not nothingness; it is an undifferentiated, dark, and formless totality in which everything exists in potential form. From this background emerges Atum, the self-begotten principle, who rises above the primordial mound and initiates the process of organizing the cosmos. From Atum, the Ennead unfolds: Shu and Tefnut, Geb and Nut, and finally the gods who embody the drama of order, death, and regeneration.

The analogy with the Big Bang is deeply narrative, not literal. The early universe described by physical cosmology resembles Nun in its undifferentiated nature: radiation and matter coupled together, without structures, without spatial hierarchies. Cosmic inflation plays a role analogous to the emergence of Atum: it does not create matter, but it establishes order, sets scales, defines the geometry of the cosmos, and makes differentiation possible.

The subsequent history of the universe - nucleosynthesis, recombination, the formation of structures - can be read as a physical genealogy of order, comparable to the divine genealogy of the Ennead. In both narratives, the cosmos does not appear as a finished entity but rather organizes itself progressively from a primordial background.

4. The Big Bang and Hesiod

In the Theogony, Hesiod states: "In the beginning was Chaos." Chaos is neither confusion nor material disorder; it is an opening, an abyss, an open space where there is yet no foundation or direction. Only later do Gaia, the firm ground, and Eros, the force of union and generation, appear.

This structure resonates with extraordinary depth in the scientific account of the Big Bang. The initial state of the universe is not yet a world: it is a threshold where space and time are coming into being. Like Chaos, it is not a thing, but a condition. The initial expansion of space can be interpreted as the establishment of Gaia: the emergence of a geometric "ground" where physical processes can take place. And gravity, which brings together what has been scattered by the expansion, plays a role narratively akin to that of Eros: the force that allows multiplicity to become structure.

Hesiod does not offer a causal

explanation in the modern sense; he offers an ontological narrative. Science, for its part, offers a causal explanation without personification. But both narratives share a profound understanding: the origin is not a thing, but a sequence of conditions that make the world possible.

5. The Big Bang and Mayan cosmogonya

The Popol Vuh describes a beginning marked by silence and stillness. Everything exists in potential, but nothing manifests itself. The gods deliberate, experiment, and make corrections. Creation occurs in stages until a form of the world capable of sustaining life, memory, and speech is achieved.

The scientific Big Bang presents a surprisingly similar logic. The universe has existed since the beginning, but for long periods it was not yet a habitable or comprehensible world. After recombination, the cosmos entered a dark age; only much later did the stars and the elements necessary for life appear. Cosmic history is a story of maturation, not of instantaneous emergence.

In both narratives, the world is defined not merely by its existence, but by its capacity to sustain history. The humanity of Popol Vuh emerges when it is able to remember and speak; the scientific universe becomes meaningful when it is able to produce complexity, consciousness, and reflection.

6. The Big Bang and the Kogui Worldview

For the Kogui, the Great Mother came first, and before form there was Aluna, the primordial thought. The world was conceived before it was manifested. Aluna is neither a place nor a time; it is a foundational plane from which reality is woven.

Scientific cosmology asserts, in different terms, something deeply related: before material structures existed, there were physical laws, symmetries, and mathematical relationships. The universe is not arbitrary; it is governed by an order that precedes form. The Big Bang does not introduce the laws: it manifests them under extreme conditions.

Furthermore, for the Kogui, the origin is not an event of the past, but an active reality that demands balance and care. Similarly, the Big Bang has not "ended": the expansion of the universe continues, and the initial conditions continue to determine the structure of the cosmos. In both cases, the origin is not a memory, but an active presence.

CHAPTER II

THE CYCLICAL UNIVERSE AND THE BIG BOUNCE

The Origin of the Universe as Rhythm, Recurrence, and Renewal of the Cosmic Order.

1. A Scientific Account of the Cyclic Universe and the Big Bounce

The most prominent authors of this approach are primarily: Roger Penrose, who formulated Conformal Cyclic Cosmology in Cycles of Time (2010); Paul Steinhardt and Neil Turok, authors of Endless Universe (2007), in which they develop the cyclic model based on ekpyrotic theory, further elaborated by Turok in The Universe Within (2012); and Martin Bojowald, who, drawing on loop quantum gravity, proposes the Big Bounce model in Once Before Time (2010).

According to Penrose, "each universe can be the origin of the next in an infinite succession of eons"[4]. According to Turok, "the cosmos possesses continuity; each cycle retains information that influences the next."[5]; according to Paul Steinhardt, it could be said that "the universe can renew itself indefinitely through cycles of expansion and contraction"[6].

The standard model of the Big Bang successfully describes the early evolution of the universe, but it leaves one fundamental question unanswered: the initial singularity. Within the framework of general relativity, as we go back in time, the expansion of the universe inevitably leads to a state of infinite density, infinite temperature, and infinite curvature of spacetime. However, from the perspective of theoretical physics, singularities are not actual

physical events, but rather indicators that a theory has reached the limit of its validity.

The cyclic universe and Big Bounce models arise precisely from this epistemological concern. Their starting point is a simple yet profound assertion: the Big Bang may not have been an absolute beginning, but rather a transition between cosmic phases. Instead of an origin from nothing, the universe would have undergone a prior contraction that culminated in a rebound, giving rise to the expansive phase we observe today.

In the context of Quantum Loop Cosmology, the geometry of spacetime is not continuous but discrete at extremely small scales. When the universe contracts and reaches densities close to the Planck density, the quantum effects of the geometry generate a repulsive pressure that prevents total collapse. In this scenario, the singularity is replaced by a quantum bounce: a moment of finite maximum density from which the universe begins to expand again.

From this perspective, the Big Bang ceases to be the "first instant" of time and becomes a phase transition, comparable to a change of state in matter. Before the bounce, the universe existed in a different regime; after the bounce, a new cosmic history emerges with observable properties similar to those of the present.

Other approaches, such as ekpyrotic and cyclic models - developed in the context of extra-dimensional theories - describe a universe that undergoes long phases of expansion, followed by phases of slow and orderly contraction. In these models, contraction does not lead to chaos but rather smooths out irregularities, setting the stage for a new rebound. The universe, within this framework, has neither a single beginning nor a definitive end but behaves as a rhythmic system of birth, dissolution, and rebirth.

A central aspect of these models is the arrow of time. In a cyclic universe, time does not disappear, but its directionality is redefined. Each cycle has its own internal arrow of time, associated with the increase in entropy within that cycle, while the overall structure of the cosmos may be eternal. This raises profound philosophical questions about the nature of time, cosmic memory, and the continuity of the universe's identity across cycles.

From the perspective of the philosophy of science, cyclic models represent a significant conceptual shift: the origin ceases to be a singular event and becomes a recurring condition. The cosmos is not born just once; it is recreated. The Big Bang is no longer the beginning of being, but rather an instance of becoming.

2. General Narrative Dialogue: Origin as Rhythm and Return

Ancient worldviews have, with remarkable frequency, conceived of the origin of the world not as a single event, but as a rhythm. Primordial time does not move in a straight line; it turns, returns, and folds back upon itself. The universe dissolves and reappears, dies and is reborn, like a great cosmic organism.

The model of the cyclical universe fits naturally within this sensibility. Whereas the Big Bang with inflation emphasizes the historical beginning, the cyclical universe emphasizes the continuity of the essence and the renewal of form. The visible world emerges, organizes itself, wears away, and returns to a primordial matrix, from which it re-emerges.

This narrative framework is not a mythical projection onto science, but rather a profound structural resonance. Both science and myth recognize that order is neither eternal nor guaranteed, and that its permanence depends on processes of restoration and balance.

3. The Cyclical Universe and the Heliopolitan Ennead

In the Heliopolitan cosmogony, Nun does not disappear after creation. It remains as the permanent backdrop of the cosmos. Order emerges from Nun, but Nun continues to exist as the possibility of dissolution and a new beginning. The so-called "First Occasion" is not necessarily unique; it is the archetype of the emergence of order from undifferentiation.

This framework fits with surprising precision into the Big Bounce model. The state of maximum density that precedes the bounce fulfills a narrative role equivalent to that of Nun: it is not destructive chaos, but a pre-formal matrix. When the universe reaches that limiting state, forms dissolve, but being is not annihilated. The bounce is the new emergence of order, a new "primordial hill" upon which the cosmos is structured.

The divine genealogy of the Ennead can be read as a metaphor for the progressive unfolding of levels of reality. Similarly, each cosmological cycle unfolds hierarchies of structure anew: from the basic geometry of spacetime to the complexity of matter and life. The cyclical universe is, in this sense, a recurring cosmogony.

4. The Cyclical Universe and Hesiod

In the Theogony, the cosmos is not established without conflict. Following Chaos, primordial forces emerge that struggle, succeed one another, and replace one another. The Olympian order does not arise from an instantaneous creation, but from a series of crises, overthrows, and reorganizations.

This view of order as the result of processes rather than as an original state aligns deeply with cyclical cosmology. Each cosmic cycle involves a phase of disintegration of the previous order and the emergence of a new regime. The Big Bounce can be interpreted as a physical version of the Hesiodic succession: the world collapses to a limit and, from that limit, reorganizes itself.

Furthermore, in Hesiod, Chaos is not eliminated. It remains as a latent condition, as a background that can reappear. Similarly, in the cyclical universe, the extreme state is never definitively left behind. It is a constitutive part of the cosmos's becoming.

From this perspective, cyclical cosmology does not contradict the Greek intuition of order; it radicalizes it. The cosmos is not a static equilibrium, but an unstable harmony that must be constantly renewed.

5. The Cyclical Universe and Mayan Cosmogony

The Popol Vuh recounts a creation by trial and error. The first worlds fail; the first human civilizations are unable to sustain memory or language. Only after several processes of adjustment does a stable world emerge.

This narrative finds a direct parallel in the cyclical universe. The cosmos is not realized once and for all. Each cycle can be understood as a cosmic "attempt" in which conditions are refined. This is not a mistake, but rather a learning dynamic of the universe.

The Maya notion of time as a succession of eras or suns reinforces this interpretation. Cosmic time is not linear; it is structured in great cycles of creation and destruction. The Big Bounce offers a physical interpretation of this intuition: the universe goes through entire eras before restarting.

In both narratives, the world is precious precisely because it is not eternal in its form. Its stability is an achievement, not a given.

6. The Cyclical Universe and the Kogui Worldview

For the Kogui, the world is a living fabric that can lose its balance. The origin is not a distant event, but a reality that must be continually renewed through care, thought, and just action. When balance is disrupted, the world falls ill.

The cyclical universe resonates deeply with this vision. The cosmos is not an eternal machine that functions on its own. It is a dynamic system that cycles through phases of order and disorder, of expansion and contraction. The rebound can be interpreted as an act of cosmic restoration: the moment when the universe regains its capacity for form.

While science describes this process in terms of quantum geometry and the dynamics of spacetime, the Kogui worldview expresses it in ethical and spiritual terms. However, both narratives agree on one essential point: the origin is not locked away in the past; it is active in the present.
The cyclical universe invites us, as the Kogui do, to think of the cosmos not as a finished object, but as a process that demands understanding, respect, and care.

CHAPTER III

THE INFLATIONARY MULTIVERSE

The origin of the universe as a proliferation of worlds and the radical expansion of the notion of the cosmos.

The leading proponents of this view are: Andrei Linde, the creator of the theory of chaotic and eternal inflation, presented in Particle Physics and Inflationary Cosmology (1990). Alongside him are Leonard Susskind, who developed the concept of the cosmological landscape in The Cosmic Landscape (2005); Brian Greene, author of The Hidden Reality (2011), one of the most comprehensive accounts of the various multiverse hypotheses; and Max Tegmark, who expands on this vision from a mathematical perspective in Our Mathematical Universe (2014).

1. A Scientific Account of the Inflationary Multiverse

The inflationary multiverse model emerges as an unintended but persistent consequence of certain formulations of cosmic inflation. While in the standard inflationary model inflation is a brief episode that precedes the thermal evolution of the universe, in other scenarios inflation does not end globally, but only locally. The result is a process known as eternal inflation, in which different regions of space stop inflating at different times, giving rise to multiple bubble universes.

Within this framework, the observable universe - the one we can study empirically - would be just one of these bubbles. Each bubble is born when inflation stops locally and the energy of the inflationary field is transformed into particles and radiation, triggering a "local" Big Bang. From within each bubble, the universe appears as a complete cosmos, with its own history, its own physical constants, and its own effective laws.

The global inflationary background, on the other hand, continues to expand and produce new bubbles. This process may, in principle, be endless. The origin, then, ceases to be the birth of the universe as a whole and becomes the birth of individual universes within a broader reality. The Big Bang is no longer the origin of everything, but rather the origin of the observable. One of the most radical implications of this model is the possible variation of physical constants across different universes. If fundamental fields can adopt different vacuum states, then parameters such as the strength of forces, particle masses, or even the number of spatial dimensions could vary from one bubble to another. The universe we inhabit would simply be the one in which these constants allow for the formation of complex structures, stars, chemistry, and life.

This line of reasoning introduces the so-called anthropic principle: we do not observe the universe as it is because it is the only possible one, but because it is one of the few in which an observer can exist. In the context of the multiverse, the anthropic principle ceases to be a trivial observation and becomes an explanatory tool: the seemingly "fine-tuned" properties of the universe do not require a single cause, but rather emerge from a statistical distribution of possible universes.

From the perspective of the philosophy of science, this model poses profound challenges. The best-known is the problem of measurement: if there are infinite universes, how are probabilities assigned? How is the relative frequency of different types of universes compared? Without a well-defined measure, the multiverse risks losing its predictive power.

Another challenge is that of falsifiability. The other universes, by definition, cannot be observed directly from our own. The defense of the model rests on its internal consistency and on the fact that it arises naturally from well-established inflationary theories. The multiverse is not proposed as an additional hypothesis, but rather as a theoretical consequence that is difficult to avoid within certain mathematical frameworks.

Despite these difficulties, the inflationary multiverse represents a profound conceptual shift: the cosmos is no longer unique. The origin is no longer conceived as a singular event, but rather as a continuous generative process - a universe factory.

2. General Narrative Dialogue: Origin as Multiplicity

Las cosmovisiones ancestrales rara Ancient worldviews rarely conceived of the world as an isolated, singular reality. They often imagined overlapping planes, multiple worlds, stratified heavens, or successive ages of the cosmos. The inflationary multiverse, far from being a modern extravagance, revives this archaic intuition: reality always exceeds the visible.

The decisive shift brought about by the multiverse is not technical, but ontological. It expands the very

concept of the cosmos. The universe ceases to be the whole and becomes a region. Reality is not limited to what is observable. This expansion resonates deeply with traditional cosmogonies, which always distinguish between the manifest world and a broader, invisible, or inaccessible background.

3. The Multiverse and the Heliopolitan Ennead

In Heliopolitan cosmogony, Nun is not merely the origin of the visible cosmos; it is a boundless matrix of potentiality. Order emerges from it, but Nun is not exhausted by that emergence. It remains as an infinite background, preceding and following the structured world.

The inflationary multiverse offers a physical interpretation that is surprisingly close to this image. The eternal inflationary background fulfills the role of Nun: a generative reality that produces multiple cosmoses without being exhausted. Each bubble universe is comparable to a new First Occasion," a local emergence of order from the primordial background.

The Ennead describes a cosmos organized into levels and genealogies. Similarly, the multiverse describes a hierarchy of realities: the inflationary background, the cosmic bubbles, and, within them, the structured worlds. The difference lies in language, not in narrative structure. Heliopolis expresses in symbols what physics attempts to formalize in equations

4. The Multiverse and Hesiod

Hesiod's Theogony is a narrative of proliferation. From Chaos, multiple primordial entities emerge, and from these, in turn, new generations of gods. The cosmos does not arise from a single lineage, but from a multiplicity of lineages that unfold from a common background.

The inflationary multiverse can be interpreted as a cosmological theogony. Each bubble universe is a "generation" arising from the inflationary background. There is no single privileged cosmic order, but rather a multiplicity of possible orders. The universe we inhabit is simply one among many.

However, Hesiod introduces an element that physics cannot provide: the legitimization of order. The narrative culminates in the reign of Zeus, who stabilizes the cosmos. The multiverse, by contrast, lacks a final unifying principle. This absence raises a philosophical concern: if all universes are possible, what is the foundation of the order we inhabit?

The multiverse responds with statistics; Hesiod responds with myth. Both acknowledge, however, that order is not necessary, but contingent.

5. The Multiverse and Mayan Cosmogony

Popol Vuh describes creation through successive attempts. The gods create worlds that do not function and humankinds that have no memory, until finally a humanity capable of speech and memory emerges. Creation is not a single act, but a series of versions.

The inflationary multiverse expresses this same logic in physical terms. There are countless universes that do not allow for structure, others that collapse rapidly, and others in which complex chemistry cannot exist. The universe we know is one of the few that "work."

In Popol Vuh, divine deliberation replaces natural selection; in the multiverse, anthropic selection fulfills that role. Both narratives agree on one essential idea: not everything that is possible is habitable, and the world we inhabit is the result of a selection.

6. The Multiverse and the Kogui Worldview

For the Kogui, the visible world is only a part of reality. There are invisible planes, spiritual worlds, and levels of existence that are not accessible to ordinary perception. Aluna is the plane where everything is conceived before it manifests.

The multiverse resonates with this view by asserting that reality is broader than the observable universe. However, the difference is crucial. For the Kogui, the multiplicity of planes implies responsibility: the balance of the world depends on conscious human action. The multiverse, in its scientific formulation, describes multiplicity without ethics.

This contrast is revealing. The Kogui worldview reminds us that expanding the cosmos without expanding consciousness can lead to an incomplete understanding. Science describes proliferation; the ancestral worldview reminds us of the need for care.

7. Final Reflection on the Chapter

The inflationary multiverse represents one of the most radical expansions of the human cosmological imagination.

It dissolves the idea of a single cosmos and places us within a vast, possibly infinite reality. In this sense, it does not break with ancient cosmogonies but rather rediscovers them on an unexpected level.

Like ancient myths, the multiverse confronts us with the boundless. It reminds us that reality always exceeds our categories. The difference is that, while myth inscribes that boundlessness within a horizon of meaning, contemporary science is still seeking ways to integrate this vastness into an understanding that is not merely technical.

CHAPTER IV

QUANTUM COSMOLOGY AND THE EMERGING UNIVERSE

The leading proponents of this view of the origin of the cosmos are as follows: Stephen Hawking, who popularized and developed the cosmological implications of the no-boundary proposal in A Brief History of Time (1988); James Hartle, who co-authored with Hawking the seminal article "Wave Function of the Universe" (1983), in which the no-boundary proposal is formulated; Alexander Vilenkin, who explores the quantum origin of the universe in Many Worlds in One (2006); and Carlo Rovelli, whose relational interpretation of space and time is developed particularly in Quantum Gravity (2004) and The Order of Time (2018), works that are fundamental to understanding the emergent nature of time in contemporary physics.

According to Stephen Hawking, "if time began with the universe, asking what happened 'before' the Big Bang loses its physical meaning."[7]. For his part, James Hartle tells us that "the universe may not have an initial temporal boundary; time emerges from a quantum state"[8].

1. A Scientific Narrative of Quantum Cosmology and the Emerging Universe

Quantum cosmology emerges where the Big Bang model - even when supplemented by inflation - reaches its conceptual limit. As we go back to the earliest moments of the universe, the equations of general relativity predict a singularity: a point where spacetime becomes infinitely curved and physical quantities are no longer defined. From the perspective of theoretical physics, this singularity is not interpreted as a real event, but rather as an unequivocal sign that the classical framework is no longer valid.

Quantum cosmology proposes a radical shift in perspective: the origin of the universe should not be thought of as an instant in time, but rather as the process through which time itself emerges. In this approach, the notions of "before" and "after" lose their meaning at the origin. Time does not precede the universe; it arises with it.
One of the most influential proposals in this field is the so-called no-boundary proposal, formulated by Hartle and Hawking. According to this idea, the universe can be described by a wave function defined on compact geometries, without an initial temporal boundary. The origin is not an abrupt boundary, but a smooth transition from a quantum regime where time behaves like an additional spatial dimension. Analogous to the surface of a sphere - finite but without a boundary - the universe would have a beginning without a classical singularity.

Another significant proposal is that of quantum tunneling from nothing, associated with Alexander Vilenkin. In this scenario, the universe emerges through a process of quantum tunneling from a state devoid of classical space and time into an inflationary state. Here, "nothing" does not signify an absolute void, but rather the absence of classical geometry. The universe does not arise from a temporal cause, but rather through a quantum transition permitted by the very laws of physics.

Both proposals converge on a crucial point: the origin of the universe cannot be described as an ordinary causal event. There is no "before" in the physical sense. The origin is an ontological threshold - a transition from a pre-geometric, timeless regime to one in which space, time, and causality acquire meaning.

From the perspective of the philosophy of science, this approach entails a profound transformation of the concept of explanation. It is no longer a matter of explaining one event by means of a prior event, but rather of explaining the conditions that make temporal experience itself possible. Quantum cosmology does not answer the question "What happened before the Big Bang?"; instead, it dissolves the question by demonstrating that time did not yet exist as a physical parameter.

2. General narrative dialogue: origin as silence and possibility.

Ancient cosmogonies have grasped with remarkable clarity that the origin of the world cannot be recounted using

the categories of ordinary time. Before the world, there is silence, darkness, thought, primordial water, or an abyss. This is not because nothing is happening, but because the framework in which anything could happen does not yet exist.

Quantum cosmology finds itself, unexpectedly, in deep harmony with this intuition. The origin is not a chronological moment, but a shift in ontological regime. The world begins when it becomes narratable - when time emerges as a sequence and causality as a relationship.

3. Quantum Cosmology and the Ennead of Heliopolis

In the cosmogony of Heliopolis, Nun precedes the world without being "before" in a temporal sense. Nun is a primordial condition, not an event. From it emerges Atum, which inaugurates order and differentiation. Time begins with creation; does not precede it.

This scheme finds an extraordinarily precise parallel to quantum cosmology. The pregeometric regime fulfills the role of Nun: there is no time, there is no defined space, there is no history. The emergence of the classical universe is equivalent to the emergence of Atum on the primordial hill: the first stable state from which the cosmos can unfold.

The condition without border can be interpreted, narratively, as a mathematical version of the Heliopolitan myth: the world emerges without violent rupture, from a deep continuity that is not yet time. The difference is one of language; the structural intuition is the same.

4. Quantum Cosmology and Hesiod

Hesiod begins his Theogony with a radical assertion: "First came Chaos." As has already been noted, Chaos is not disorder, but rather an opening, a primordial void, a gap. It is not a state within time, but the condition that allows time and order to emerge.

Quantum cosmology translates this intuition into physical terms. The primordial quantum regime is not chaotic in the ordinary sense; it is governed by profound laws, yet it lacks the structures that allow for the definition of temporal succession. Time emerges when the universe acquires a classical geometry.

Just as the world begins in Hesiod's account with the appearance of Gaia and Eros - solid ground and the force of connection - so too in quantum cosmology the world begins with the emergence of classical spacetime and stable interactions. Greek myth expresses through imagery what physics attempts to formulate in equations: the origin is not an instant, but an ontological transition.

5. Quantum cosmology and Mayan cosmogony

The narrative of Popol Vuh begins with a state of absolute silence. There is no sun, no moon, no movement. Everything is held within a primordial stillness. Creation does not erupt violently; it unfolds progressively from that silence.

This Mayan beginning engages directly with quantum cosmology. The pre-temporal state of the universe is neither noise nor chaos, but a silent condition from which history emerges. Only when the universe acquires structure and temporality can the narrative begin.

Furthermore, Popol Vuh insists that true creation occurs when the world is capable of sustaining memory and the spoken word. Analogously, quantum cosmology suggests that the universe becomes "real" in a narrative sense only when time emerges, enabling the existence of processes, observers, and consciousness.

6. Quantum cosmology and the Kogui worldview

The Kogi worldview offers perhaps the deepest parallel to quantum cosmology. For the Kogi, before the world existed, there was Aluna - the primordial thought of the Great Mother. Aluna is neither time nor space; it is possibility, intention, and conception.

The universe was conceived before it was woven. Time and form emerge after the primordial thought. This structure strikingly aligns with the scientific concept of a quantum state of the universe that precedes classical spacetime.

For the Kogi, the origin is not in the past; Aluna continues to operate in the present. Similarly, in quantum cosmology, initial conditions are not a distant memory; they determine the overall structure of the current universe. The origin remains active.
The fundamental difference lies in the ethical dimension. While quantum cosmology describes the emergence of the universe neutrally, the Kogi worldview introduces a sense of responsibility: if the world was woven from a primordial thought, human thought plays a role in its balance or imbalance.

7. Final reflection on the chapter

Quantum cosmology pushes the question of origin to its absolute limit. Where time vanishes, language proves insufficient. Myth and science meet - not because they say the same thing, but because both acknowledge silence as a condition of the origin.

The emerging universe does not arise from nothingness, but from a depth that cannot be expressed in ordinary terms. Ancestral cosmogonies understood this; contemporary physics is beginning to formulate it with mathematical rigor.

This chapter concludes the monograph's cosmological arc: from origin as historical beginning to origin as rhythm, to origin as proliferation, and finally to origin as ontological threshold. The dialogue between science and ancestral worldview does not impoverish either discourse; rather, it reveals their shared depth.

CONCLUSIONS

The Origin of the Cosmos as a Scientific, Narrative, and Anthropological Problem

The comparative analysis presented in this document demonstrates that contemporary scientific models of the universe's origin function not merely as mathematical constructs but also as scientific narratives that structure our understanding of time, order, and reality.

The ancestral cosmogonies examined - Greek, Egyptian, Mayan, and Kogi - do not represent naive explanations of the world; rather, they are complex symbolic systems capable of articulating profound concepts regarding the emergence of the cosmos, the relationship between substance and form, and the non-absolute nature of order.

The structural convergence between science and cosmogony implies not an identity of content, but an affinity regarding fundamental problems: the origin understood as a process, a transition, a rhythm, or a threshold, rather than simply as a discrete event.
An examination of the four scientific models reveals a progressive shift in the concept of origin: moving from the historical beginning of space-time and the notion of a cyclical, recurring origin, to the very dissolution of the concept of "before" in quantum cosmology. This shift finds remarkable parallels in ancestral narratives.

Incorporating the Kogi worldview introduces a crucial dimension absent from scientific cosmology: the ethical dimension of origin. For the Kogi, the cosmos is not merely something to be explained, but something to be cared for. The origin is not confined to the past; it remains active in the present.
This dialogue suggests it is valid to consider that many ancestral cultures possessed a profound, relational, and non-instrumental knowledge of the cosmos - one capable of grasping structures that science is only now beginning to formalize through different languages.

The modern separation of science and myth, while useful for technical development, has impoverished our holistic understanding of origin. Restoring the dialogue between these two discourses does not undermine scientific rigor; rather, it broadens the epistemological horizon from which fundamental questions are formulated. Finally, this work proposes that the study of the universe's origin should not be limited to describing physical mechanisms but should be integrated into a broader anthropological reflection - one in which the cosmos is understood not merely as an object of knowledge, but as a meaningful reality that engages human consciousness.

NOTE

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THE COMPLEXITY OF PLACE AND NON-PLACE:

THE RESIGNIFICATION OF SPACE IN SUPERMODERNITY

ALINE FEIJÓ BIANCHINI

We never encounter the world once and for all;
it changes according to the places
where we stop.

Henry David Thoreau

INTRODUCTION

This research addresses the analysis of and reflection on the concepts of place and non-place in the context of supermodernity, based on the theories of the French anthropologist Marc Augé. In his work, Augé distinguishes between "place" and "non-place" to describe different ways of experiencing and perceiving space in contemporary society. "Place" is the space that has identity, history, and social relations, understood as an environment with profound meaning for individuals. "Non-place" refers to transitory spaces such as airports, shopping malls, commercial centers, subway stations, hotel chains, highways, supermarkets, waiting rooms, digital interfaces, etc., where people do not establish lasting bonds and social relations are impersonal and decontextualized.

In supermodernity, which is characterized by the acceleration of social, technological, and cultural transformations, the "non-place" becomes increasingly important. This monograph explores how the intensification of globalization, constant mobility, and digital hyperconnection have reconfigured the way individuals relate to the spaces they inhabit. This phenomenon of the resignification of space reveals the new social dynamics that emerge in the contemporary context, in which experiences of digital immersion and the incessant movement of individuals challenge traditional notions of belonging and identity.

Marc Augé, a French anthropologist, researcher, and writer widely recognized for his contributions to contemporary anthropology, became especially known for developing the concept of non-places, one of the keys to understanding human experience in the age of global mobility and hyperconnectivity. The researcher was also one of the most influential voices in the reflection on supermodernity: his proposal for describing the intensifications of modernity at the end of the twentieth century and the beginning of the twenty-first.

When reviewing the tradition of classical anthropology in the reissue of the book Non-Places (2008), the thinker recalls that "the distant" was the privileged site of anthropological research: African villages, Pacific islands, that is, "other" peoples. With the process of globalization, that "far away" draws near: the "other" is among us through migrations, tourism, the media, etc. He then discusses the displacement between being in the field and being in the world, showing that the anthropologist can no longer clearly separate the "here" from the "there". In other words, everyday Western space itself becomes exotic, so to speak, and becomes a legitimate object of anthropology. Augé therefore positions himself as an anthropologist of the "here and now," proposing a true anthropology of everyday life, worthy of ethnography.



1. SUPERSUPERMODERNITY AND THE SUPERMODERN SUBJECT ACCORDING TO MARC AUGÉ

The term "supermodernity" is presented by Augé above all in the work Non-Places: Introduction to an Anthropology of Supermodernity, first published in 1992, in an attempt to name the historical configuration that succeeds or intensifies modernity, marked not by utopian ruptures, as postmodernity suggested, but by excesses. For Augé, we do not live in a "post" era, but in a "super" one; that is, an intensification of the modern logics of speed, circulation, individualization, consumption, and global communication.

Augé identifies three founding excesses of supermodernity. The first refers to the excess of time, in the sense that temporal experience accelerates and fragments. There is a kind of exacerbated "presentism," that is, a certain idea that only the present truly exists, denying the full reality of the past and the future. This idea manifests itself in contemporary life as the sensation of living "everything at the same time". Such temporal acceleration turns the past into something obsolete and the future into something uncertain or confusing, leading to total immersion in the now, often paradoxically: the excess of digital information and the pursuit of immediate experiences contrast with ideas of progress or linear history. We live under constant updates: the world changes so quickly that collective memory weakens and temporal identity becomes precarious.

Paradoxically – and precisely because of this layer of acceleration – the experience of this "presentism" is not capable, by itself, of generating a condition of conscious connection with the present. On the contrary, the dispersion among so many activities, notifications, and distractions is so great that the effect is the opposite: a feeling of never being truly present, since that would require attention and concentration, something difficult to sustain under this state of living "everything at the same time".

According to Hartmut Rosa, in Acceleration: The Transformation of the Temporal Structures of Modernity (2001), acceleration causes us to live in a present that is never truly lived, as if acceleration created a "punctuated" present, incapable of being experienced as presence. He states that "the acceleration of life causes the present to lose its thickness" (2001, p. 25), that is, we have a fleeting and depthless present: functional instants that do not become experiences.

In this way, life becomes a succession of simultaneous tasks, what Rosa

calls the multichronicity of life: several tasks, flows, and demands occurring at the same time, turning us into beings of compulsory multitasking. "Technical and social acceleration forces the subject to perform multiple actions simultaneously in order to remain 'on time'" (2001, p. 83), that is, in order not to fall behind, the individual completes more and more tasks, losing the ability to focus, deepen, and be present.

The second excess identified by Augé is that of space, related to the superabundance of places. We have never circulated so much nor been exposed to so many spaces (physical and digital). However, these spaces do not necessarily generate rootedness or meaning. And it is precisely in this context that non-places emerge as spaces of circulation, consumption, and communication, but not of identity, history, or relation.

The third excess has to do with the ego. For Augé, the subject of supermodernity is strained by hyperindividualism, the demand for performance, self-referentiality, relational loneliness, and the need for recognition. At the same time that communication multiplies, identities fragment and true connection between human beings is diluted.

For Alain Ehrenberg, we live in a society that requires each person to be an "entrepreneur of the self" (2010, p. 15), producing subjects overloaded by the permanent obligation of performance and self-realization. For the author, in late modernity the individual ceases to be repressed and becomes obliged to realize himself, constantly demanded by a society that requires autonomy, performance, and self-management. According to him, the result is an exhausted subject, overloaded by the demands of "being himself".

This idea of self-sufficiency intensifies in the technological universe analyzed by Sherry Turkle, where, according to her, "we expect more from technology and less from one another" (2011, p. 1), reinforcing forms of disconnected presence that deepen emotional isolation. Together, these authors show that the excess of ego described by Augé is not merely a psychological trait, but a structural condition: the supermodern individual is pressured to be autonomous, flexible, and connected all the time – at the cost of stability, relation, and the deep experience of the self and of others.

In this sense, as we have seen, the supermodernity proposed by Augé is marked by the excess of time, excess of space, and excess of individuality, which consequently generate an acceleration of life, the multiplication of circulation, the weakening of bonds, and the appearance of the so-called non-places, radically redefining the individual's experience in the contemporary world. It would not be a "postmodern" time, but a super- or hypermodern one, saturated, in which modernity continues to advance with the same logic, but in amplified form.

2. NON-PLACES AND THE RECONFIGURATION OF SPACES IN SUPERMODERNITY

Considering the three main characteristics of supermodernity – which lead to the experience of a constant but volatile present; to a world that is large and, at the same time, small (since we can cross continents in a matter of hours); and to the excess of ego, in which individuals are continually solicited, observed, and identified – non-places appear as the direct product of these excesses.

Augé uses the term to designate the spaces where supermodernity is even further exacerbated, that is, where the accelerated, globalized, and transitory world becomes even more evident, and people pass through but do not remain; they cross but do not relate. In them, individuals exist as users, passengers, consumers, clients – and not as singular persons, with history, roots, and bonds.

Non-places are functional, neutral, impersonal, designed for flows, efficiency, and transit, but not for encounter (neither with others nor with oneself). They function as true infrastructures of circulation in supermodernity. Such spaces produce anonymity: although we are surrounded by people, we are not really "seen"; for a moment we are part of an agglomeration of "passengers" that will soon move on. They are, therefore, spaces that do not build identity, do not create bonds, and do not generate belonging.

Augé contrasts the non-place with the anthropological place, a space where identity, history, relation, rituals, memory, and rootedness exist. In this way, places properly speaking have the potential to welcome and rescue human aspects. According to the author, the

anthropological place is relational, insofar as it organizes relations between people; historical, because it accumulates memory, events, and narratives; and identity-forming, since it contributes to defining who we are.

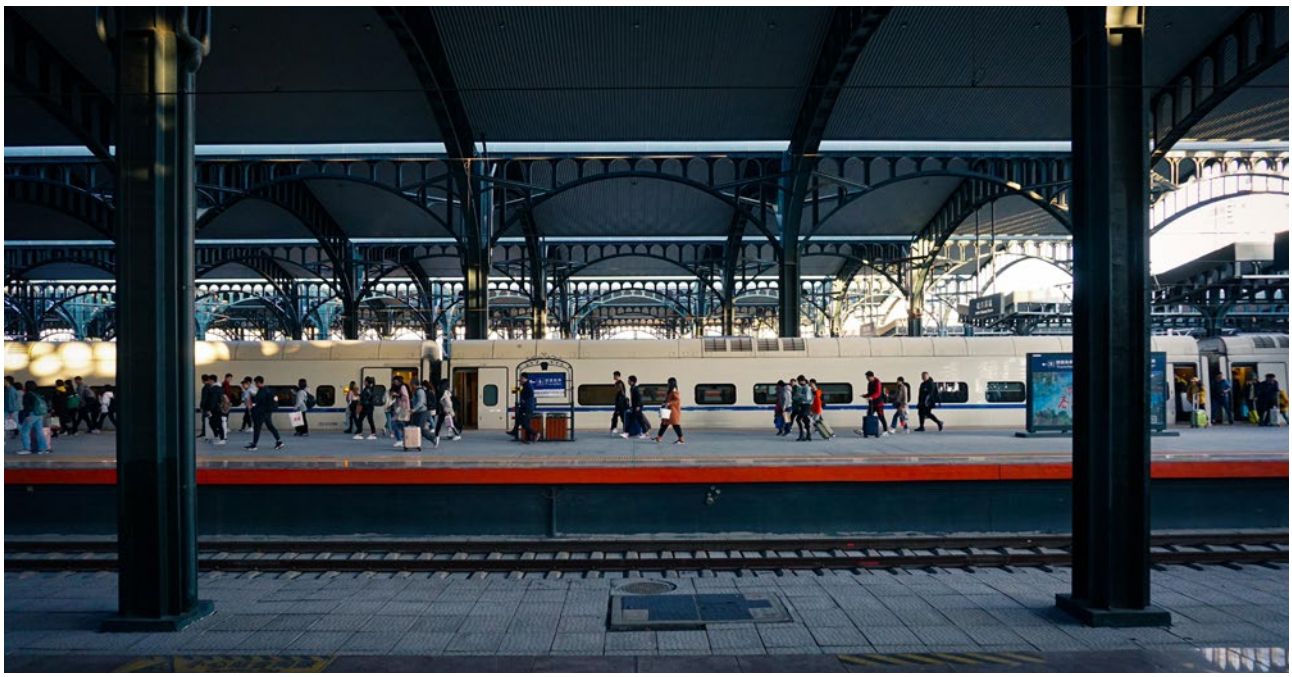
Inspired by thinkers such as Mauss, Lévi-Strauss, and Michel de Certeau, Augé considers as examples of anthropological places the village with its rites, the square, the sanctuary, the house with its history, etc. They are spaces where social life is visibly inscribed, with its rules of residence and coexistence, its monuments, rituals, affections, and collective memory. By contrast, the non-place does not possess enough meaning to be called a "place". In other words, supermodernity creates a proliferation of spaces of circulation, consumption, and communication (such as some of the examples mentioned earlier – airports, highways, shopping centers, chain hotels, supermarkets, large leisure complexes, etc.) that cannot be considered anthropological because they do not produce identity, relation, or collective memory[1].

In this sense, we can observe that non-places also tend to have very similar physical characteristics (architecture and aesthetics, for example), without a strong cultural identification of their own, in a kind of aesthetic homogenization. Let us imagine that we are at a street market in India or Sicily, or even at a popular market in Morocco or Mexico: the colors, smells, forms, gestures, and practices of negotiation would be very different. With regard to the non-place (whether a shopping center, an airport, or a bus station), it is possible to watch videos from different countries without being able to identify where we are, and we might even be looking at images of the same space without realizing it.

Non-places are also spaces we pass through without leaving traces – and that leave no traces on us – composing a scenario of contemporary life in which human presence is reduced to a continuous flow. They are spaces that receive, but do not welcome; nor do they invite one to remain. In non-places, identity is not built through mutual recognition, culture, or roots, but through access codes: a boarding pass, an identity document, a digital password, a QR code. The person who crosses these spaces is reduced to functionality (client, passenger, guest, user) and is generally recognized by systems.

This experience generates a type of existence that we might call transit identity, a mode of being that adapts quickly, that adjusts to the demands of flow, but that rarely finds the time or context to unfold its deeper layers.

In the thought of Zygmunt Bauman, we find fertile ground for identifying relations of fluidity as the background landscape of experiences in non-places. In his book Liquid Modernity



(2001), for example, the author describes the contemporary historical moment precisely because it offers no stable forms. In it, fluidity is the norm and everything is in constant mutation: relationships, belongings, trajectories, borders; that is, nothing fixes itself, nothing requires permanence, nothing offers the density necessary for memories to settle.

3. WHAT CAN IT MEAN TO INHABIT A NON-PLACE?

According to Bauman (2011), the liquidity of our times is not only a social characteristic, but also a psychological and political condition. In a liquid world, avoiding permanence is almost a form of protection, and remaining means committing oneself. In superficial times such as those offered by the twenty-first century, committing oneself implies losing freedom, and this, for the liquid subject, means risking too much.

By contrast, in a world in which we are increasingly demanded and pressured, the temptation to become "invisible," to "disappear" at least for a few moments, is very great. In this sense, non-places are gaining increasing popularity: spaces in which one is not recognized, does not need to justify oneself, and does not even feel driven to interact. This kind of anonymity functions as a lifeline. Thus disappears the supposed weight of bonds, roots, identity, and social roles.

The human being, however, being a social being in need of bonds, cannot sustain this condition for very long without the first symptoms appearing: loneliness, isolation, loss of identity, a sense of fragmentation. Little by little, the home, the neighborhood, the familiar and homelike give way to these new environments of passage and we, just like these spaces, begin to mean very little or almost nothing.

Stimulating at first, offering spaces of "breathing room" in the routine, as if we were living through a brief pause from commitments and responsibilities, non-places tend to generate great fatigue after a while. They are places where one encounters difference, movement, and more banal aspects of everyday life, and where the most fundamental aspects of life remain suspended.

Another fundamental aspect that we can relate to the theme concerns the relationship between space, as freedom, and place, as security (TUAN, 1977). For the author, space is open, indeterminate, potential, while place is invested with meaning. This distinction can help us understand Augé's idea that supermodernity offers us too much space (mobility, circulation, globalization, communication) while providing us with very little place (identity, meaning, memory, security).

3.1. Non-Places: An Updated Diagnosis

In 2008, Augé makes some updates to his diagnosis that may be useful for the development of the reflections proposed in this study. On that occasion, the author speaks of a triple decentering: of cities (globalization and networks), of homes (television and the computer in place of the domestic hearth), and of the individual (smartphones, permanent contact with the world). According to the author, this triple decentering leads to an unprecedented extension of non-places. Almost in a tone of protest, Augé states that "we have not yet learned to look at the world in which we live" and that we need to "relearn how to think about space".

Many later authors expanded Augé's concept toward digital environments. Social networks, feeds, applications, and even online meetings can be contemporary non-places insofar as they do not generate belonging (or generate a fragile and performative belonging). They are also spaces of passage, consumption, and distraction



that produce hyperconnection, but not bonds.

In this sense, we observe how much the expansion of the presence of non-places in everyday life contributes to worrying and extremely current problems, such as loneliness – which reaches epidemic levels in contemporaneity – and the growth of liquid relationships (BAUMAN, 2001), which are also accentuated in these transitory environments[2].

Reinforcing the paradoxical panorama of a complex world, according to Turkle (2011), digital technologies create the illusion of connection, but ultimately reinforce emotional isolation. In them, people shape edited versions of themselves and begin to negotiate superficial relationships. Moreover, hyperindividualism intensifies in interactions mediated by digital devices: each person becomes their own "project," their own brand.

Another interesting point offered by the author, a psychologist and researcher at MIT, is that technology has created a new modality of presence: we are connected all the time, but we are rarely fully in one place, since the digital fragments the here and now. In the transportation app we are on the street, but also conversing through messages. In the supermarket we answer emails and, at the airport, we post photos. In the car we listen to podcasts while sending voice messages; that is, we are always in transit between physical and digital places. The result is a divided presence, a life lived between windows, generating an existence with increasingly less experiential depth.

In a discussion on globalization, urbanization, and networks, Augé states that there are no absolute places and non-places: for him, "the pair place/non-place is an instrument for measuring the degree of sociality and symbolization of a space" (2008, p. 8). Moreover, in our contemporary trajectories we frequently alternate between place and non-place, as we combine our everyday tasks with successive accesses to the mobile phone to check messages, enter social networks, etc. With the mobile phone, we always carry the non-place with us, as well as the possibility of using it as a true "cloak of invisibility" worthy of heroes, allowing anonymity or, at least, increasing the defensive barriers so that others do not come too close – either physically or emotionally.

4. FINAL REFLECTIONS

The case of Mehran Karimi Nasseri, the man who lived for 18 years in Charles de Gaulle Airport in Paris and inspired the film The Terminal, starring Tom Hanks, is perhaps the most radical expression of the concept of non-place: a subject whose entire life unfolds in a space conceived solely for transit. Deprived of documents and unable to enter France or return to Iran, Nasseri transformed Terminal 1 of the airport into a territory of survival, creating routines and micro-rituals that, in a certain way, "twisted" the rules of the non-place.

He organized his belongings on a cart, set up a kind of improvised "office" with a plastic table, read the newspapers offered to him by employees, wrote daily in his notebooks, and knew by name some airport workers, who sometimes brought him food or talked with him.

These small habits – such as repeating a daily route through the corridors, washing in the employees' bathrooms, or always choosing the same bench as "his armchair" – generated a minimal, although precarious, familiarity with the space, producing a strange way of inhabiting that which, by definition, should not be inhabitable. In other words, it was the relationships with employees, the creation of routines and rituals, and the resignification that Nasseri gradually attributed to the space that began to confer upon the airport some characteristics of place.

The case that became a film reveals that even non-places can become impregnated with traces of life, though only in a fragile and provisional way, reaffirming Augé's thesis: it is not the space that transforms itself into a place, but the individual who adapts to the relational emptiness of supermodernity.

As we have seen, the experience of non-place is today an essential component of social existence (AUGÉ, p. 119). But non-places do not completely erase places; rather, places are reconstituted within them (relations, rituals, tactical uses, etc.). This generates a fairly complex relationship when we investigate certain human phenomena. A classic example of this "invasion" or superposition is the case of international flights that prohibited the sale of alcoholic beverages while flying over Saudi Arabia, that is, an intrusion of territory (place) into airspace (non-place).

Refugees, tourists, global executives, guests of luxury hotels, consumers... to varying degrees, all cross non-places. According to Augé (2010), we live increasingly in spaces of passage, spaces without time, dedicated to transit and not to encounter. The excessive mobility of our times, however, impoverishes the experience of place, since the acceleration of movements produces a rarefied experience of

space. Moving constantly, therefore, does not generate depth in experiences – the same occurs in any valuable undertaking in life.

Occasionally experiencing the sensation of taking a "pause" from life or of being "one more stranger in the crowd" can be quite pleasant and pleasurable, because the lack of familiarity and commitment may be welcome for the tired and stressed supermodern individual. Moreover, these spaces can provide the experience of a certain degree of complicity, however superficial, with those who share the same space. But, as mentioned earlier, this light and fleeting experience does not sustain for long the human need to relate. In this sense, it is necessary to resignify places and non-places, an undertaking that involves restoring conversation, encounter, and the sensory and affective perception that only direct human contact can provide.

Agile, swift, and wearing his helmet of invisibility, Hermes becomes a kind of guardian custodian of non-places, representing passage, the bridge, the border, and inspiration for all the "travelers" who move constantly through supermodernity.

As the Brazilian musician Arthur de Faria once said, "it is the village that makes you global," that is, the true meaning of the global can only be lived once the individual has roots: and the great secret is that it is in the tradition of the village that we find precisely all the values necessary for this connection between the village and the world, between the micro and the macro – as if in the earth were set all the roots of the sky, sown with the help of our god and protective father Hermes[3].

Notes

1. It should be noted that place and non-place do not exist in a pure state, but are poles of a continuum, becoming instruments for measuring the degree of sociality and symbolization of a space.
2. In 2023, the World Health Organization (WHO) declared that the world is experiencing an epidemic of loneliness. In addition, a report by the same organization indicated that one in six people in the world is affected by loneliness, with significant impacts on health and well-being. Loneliness is associated with around 100 deaths per hour, that is, more than 871 thousand deaths each year.
3. RAMIL, Vitor (Direction). A Linha Fria no Horizonte. Brazil: TVE/RS, 1993. Documentary, 52 min. Available at: <https://vimeo.com/90478473>. Accessed on: Oct. 12, 2025.

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The Impact of Technological Development on Employment

Nahum Rozen - Israel

Abstract

This paper examines how technological advancements reshape employment by comparing the Industrial Revolution in textiles with the modern VLSI (chip design) revolution. Both transitions eliminated routine manual tasks while creating new roles and altering workforce distributions. However, the textile revolution caused severe initial hardship and "technological unemployment" for vulnerable manual workers before generating urban factory jobs. In contrast, VLSI automation primarily shifted highly educated engineers into advanced analytical roles through internal reskilling, expanding the overall sector.

These cases illustrate that while modern industries attempt "historical learning" via proactive training, automation still disproportionately threatens less-skilled workers. Warning that rapid technological progress often prioritizes efficiency over human value, the author advises organizations like "New Acropolis" to treat technology strictly as a supportive tool. To combat the alienation caused by automation, the paper advocates for philosophical education and volunteering to foster adaptability, community, and moral judgment.

Keywords: Technological Change, Technological Unemployment, Automation, Industrial Revolution, VLSI, Reskilling, Technological Change, Historical Learning, Philosophical Education, Volunteering, Inequality, Vulnerable Workers

Introduction

History teaches us that technological advances lead to the loss of existing jobs, but they also enable the creation of new jobs and shift the distribution of the workforce within a given sector. Modern economic literature emphasizes that new technologies do not “eliminate work” across the board, but rather change the composition of the tasks performed by humans and the demand for different skills. In this context, it is important to distinguish between jobs based on tasks that can be automated and jobs based on judgment, creativity, and social skills, which remain necessary even after technological change[1].

Today, as we face a new technological revolution, concerns and fears are resurfacing: Will new technology render experts in various fields obsolete? What is humanity's place in this new technological environment? Can we learn from history to improve the transition to the use of new technology?

A Historical Perspective on Technology, Unemployment, and Changes in the Structure of Employment

As early as the 19th century, Ricardo and Marx argued that the introduction of machines could harm workers, at least in the short term. Current studies revisit these claims and propose a framework of "task-biased technological change"—that is, technology replaces certain tasks but at the same time creates demand for others. Empirical studies of modern markets show that, at the level of the economy as a whole, the net impact of technology on employment depends on a combination of the pace of automation, the capacity for reskilling, and public policies regarding education, training, and the labour market[2].

Two case studies from which we can learn:

- **The Industrial Revolution in the Textile Industry**
- **Background and Technological Process**

Before the Industrial Revolution, textile production in England was based on a "subcontracting" system in which merchants supplied raw materials to rural households, and workers spun and wove by hand in their homes. This structure allowed paid work to be combined with domestic and agricultural tasks, and it primarily employed women and children. On the other hand, production was characterized by low productivity, long working hours, and job instability due to the changing needs of the families employed[3].

Starting in the mid-18th century, a series of technological innovations—including the spinning jenny, the water-powered loom, and the power loom—emerged, combining hydraulic power, and later steam power, with spinning and weaving machines that were far more efficient than manual labor. These technologies required large capital investments and led to the concentration of production in large factories, mainly in northern England, near sources of water and coal. At the same time, advances in transportation infrastructure—such as canals and railroads—were needed to enable the large-scale transport of raw materials and textile products to local and international markets[4].

The transition to the factory system gradually dismantled the traditional model of domestic production and created new labor relations between the owners of industrial capital (initial investors) and wage-earning workers. Factories imposed a different and more rigid work discipline, a division of labor among different workers, and a hierarchical organization of the workforce—all of which differed greatly from the flexible domestic labor that existed before mechanization. This change was not only technological and economic but also social and cultural, and it affected daily routines, family structure, and the urban space that developed around industrial centers[5].

Impact on Employment, Unemployment, and Society

Innovations in spinning and weaving machines severely affected the class of hand spinners, who before the revolution constituted a significant portion of the workforce in England. An empirical study on "technological unemployment" in Great Britain indicates that the wages and workload of hand weavers—including women and children—declined throughout the last decades of the 18th century and the early 19th century, until the profession virtually disappeared. In this sense, the Industrial Revolution in the textile sector is a classic example of how technology can completely eliminate an occupational sector in a relatively short period of time[6].

However, even as old jobs were being eliminated, new ones were being created in factories: machine operators, mechanics, foremen, warehouse workers, and transport workers. Historical data on wages and employment show that, beginning in the 1820s and 1830s, wages and the circumstances of some urban workers began to improve, partly due to increased productivity and rising demand for textile products. Those who began working in factories sometimes earned higher incomes than they would have in domestic service, but they paid a price in the form of difficult working conditions, long workdays, and a loss of professional independence[7].

Did this change improve or worsen the socioeconomic situation of workers? It appears that in the early decades, certain population groups suffered significant harm, particularly in villages, among women and children, and in marginalized areas that did not

benefit from the growth of factories. Only later, thanks to a combination of workers' struggles, social legislation, and economic growth, did better working conditions and basic social welfare systems begin to take hold. In this regard, it can be argued that the industrial revolution in the textile sector led to increased productivity and employment in the long term, but the benefits were distributed unevenly, and protections for workers did not keep pace with technological change[8].

The VLSI Revolution

Technological Background and the Emergence of Automation Tools

Work in the chip industry (VLSI), where integrated circuits are designed, has shifted in recent decades from relying heavily on manual labor to widespread automation using CAD/EDA tools. In the early stages of this industry, engineers and layout designers manually translated logic schematics into geometric layouts, manually adhering to the process standards of silicon chip factories. These methods were labor-intensive and limited the complexity of designs that could be completed within realistic timeframes; as a result, a typical VLSI component from that era contained several tens of thousands of transistors[9].

With the continuous increase in transistor density on the chip and the need for more complex components, it became clear that a manual approach was not a viable solution, and the need arose for automated tools for logic synthesis (translating a behavioral-language operation for implementation using logic components), for the placement of logic components, and for routing between all components—involving millions or even billions of components. The field of VLSI CAD developed advanced algorithms to optimize design and routing, such as methods based on analytical solutions and maze-based routing methods, designed to reduce the need for manual component placement and ensure compliance with operating frequency, space, and power constraints. At the same time, commercial EDA companies have developed integrated tools that enable a complete design process, from the RTL-level description (logical behavior description) to GDSII, detailed manufacturing schematics ready for production[10].

The implementation of these tools has made automation the industry standard in modern chip design, especially for large digital chips. Today, the processes of synthesis, place-and-route, verifying compliance with power and frequency specifications, and ensuring that the design is manufacturable are largely performed by automated tools, and engineers must define the constraints, analyze the results, and perform optimization, rather than manually editing every geometric detail[11].

Impact on Roles, Employment, and the Modern Labor Market

Impact on Roles, Employment, and the Modern Labor Market

The automation of the synthesis and place-and-route stages has significantly reduced the need for large teams of manual design editors for standard digital chips. Tasks that previously required individualized attention during the physical implementation phases—such as drawing metal layers for each connection between different logic components—have been replaced by automated tools that perform a global optimization that takes into account all the requirements and constraints of the VLSI component. As a result, the number of jobs dedicated exclusively to manual design has decreased relative to the complexity of the VLSI component[12].

However, just as in the historical case of the textile industry—albeit in a different context—technology has created new jobs throughout the design chain. On the one hand, there has been an increase in demand for backend engineers specializing in defining constraints, optimizing timing and power, and addressing physical integration constraints at high levels of complexity. On the other hand, new positions have emerged for CAD and algorithm engineers, who develop and improve the automation tools themselves, as well as new models of collaboration among systems, RTL, verification, and physical design engineers. Furthermore, automation has expanded the scope of the sector, making it possible to design large systems-on-chip (SoCs) and increasing the demand for highly specialized engineers.

The literature on technological change in knowledge-intensive markets indicates that, in this case, automation primarily affects routine tasks and jobs that require a high degree of repetitiveness, but it does not eliminate the need for workers; rather, it shifts the focus of value toward analytical skills, interdisciplinary coordination, and the ability to work with complex systems. At

the same time, this market offers greater potential for professional retraining within the sector itself, as workers have engineering training and can transition from manual editing to more advanced design and integration roles after receiving the appropriate training. In this regard, technological unemployment in the chip sector tends to be more limited and localized, manifesting primarily as pressure to adapt skills rather than large-scale job losses.

Summary and Comparison of the Two Case Studies

A comparison of the two case studies reveals differences in the impact of technological changes on the labor market. In the case of the Industrial Revolution in the textile sector, mechanization replaced the unskilled labour of hand weavers and led to significant job losses in rural areas, before new jobs were created in factories and urban areas. In this sense, technological change initially generated large-scale "technological unemployment," and only in the long term did a new employment structure take hold that benefited some workers, but not all[13].

In the case of the VLSI revolution, the automation of physical design processes replaced certain roles, but the sector expanded, and new positions were created that required higher education and more complex skills. The impact on employment was felt primarily by manual designers, while at the same time, demand for backend engineers, CAD engineers, and systems engineers increased, leading to a shift in the distribution of the workforce within the sector rather than an overall reduction in employment[14].

Can we say that there is a form of "historical learning" that mitigates the impact on employment? It can be cautiously asserted that, in modern markets—where there is a high level of awareness of the risks of automation—management and human resources strategies are sometimes adopted that are designed to promote reskilling, career transition, and risk diversification. Examples of this include in-house training programs at technology companies, collaboration with academic institutions, and career planning that facilitates transitions from one position to another along the value chain. However, the literature also warns that historical learning does not eliminate inequality: it appears that workers with higher levels of education and skills benefit more from the fruits of automation, while less-skilled workers remain vulnerable in both advanced and low-tech industries.

Profound technological changes lead to the loss of existing jobs and short-term job insecurity, but they also create new jobs and alter the distribution of the workforce within the sector. The difference between these two scenarios lies in the ability of workers and institutions to respond in a timely manner—through education, training, regulation, and policy—and to steer the change in such a way that its impact is limited and new opportunities are made more accessible to broad segments of society.

What can we learn from this?

Rapid and far-reaching technological advances are not neutral; rather, they reflect a mix of intentions and ideologies regarding what "progress" is and what the role of human beings is in society. Often, these advancements are driven by motives such as economic growth, efficiency, market control, and competitive innovation, which view human beings primarily as productive resources and consumers, rather than as valuable and free individuals. The scope of these processes tends to be short- or medium-term—profitability, competitive advantage, solving a local problem—while questions of meaning, identity, the relationships between humans, society, and nature, and the justification of the human and social costs are sometimes set aside or discussed only after the fact. This creates a tension between the ideology of "technological progress" as a value in itself and a philosophical conception that views human beings as an end in themselves rather than a means, and asks where technology can serve internal, communal, and human growth—rather than merely accelerating production, management, and control processes ever further.

The "New Acropolis" association presents itself as a space for promoting a philosophical way of life, in which human beings are viewed first and foremost as individuals engaged in a continuous process of learning, reflection, and self-improvement, rather than as consumers of knowledge or cultural services. Within this vision, one can speak of a "traditional pyramid" in terms of values: the pyramid is not a hierarchy of power, but rather one of responsibility and consciousness, in which the leader is the one who is most committed, sets a personal example, and possesses a deeper level of philosophical awareness; as such, they serve and accompany others as a more experienced and responsible fellow, rather than as a "holder of

power." The ideal of "a healthy person in a healthy society" is expressed here in a community where each person finds a meaningful place, in accordance with their abilities, level of development, and willingness to learn and contribute, so that the entire structure is designed to foster individual growth and the common good, and to restore a sense of belonging and purpose to the individual in a rapidly changing world.

From here to the lessons

Several practical and direct lessons can be drawn from this work for the activities of New Acropolis, since the association is a school of philosophy that seeks to strengthen both the individual and society through culture and volunteerism.

1. Remember that technology is a tool, not a substitute for human beings

Technology changes functions, but it does not replace the need for human principles such as judgment, meaning, dialogue, and community. For "New Acropolis," which promotes philosophy as a way of life and the pursuit of human potential, this means continuing to place the human being, inner education, and genuine encounter at the center, and using technology only as a tool to reinforce them, not as a substitute for them.

2. Pay attention to those who are "left out"

In the case of the textile sector, we saw that the most vulnerable workers paid a high price, and it was only later that mechanisms for protection and training were put in place. Even in places where technology "prevails", there are always those who struggle to adapt, lose their self-esteem, or their sense of worth. As an association that promotes fraternity, rather than fearing change, we strive to foster solidarity and a holistic view of the human being; we take this into account and develop mechanisms that enable a smooth transition for everyone—through dialogue, community, internal strengthening, and giving new meaning to change—thereby integrating everyone into the organizational hierarchy of the branch or the country.

3. Philo sophical Education as Preparation for Change

Research shows that the way to reduce harm is not to halt technological progress, but to strengthen adaptability, learning, moral judgment, and cooperation—that is, "soft" but essential qualities. This is precisely the core of the "New Acropolis" vision: to develop in people critical thinking, responsibility, moral imagination, and the ability to act in accordance with their values even in the face of a changing reality. Our practical philosophical activity can be seen as a kind of "internal vaccine" against technological and social upheavals.

4. Volunteering as a Practice: An Ethical Response to the Technological Age

The study highlights that innovation can create both opportunities and alienation; technology alone does not provide moral guidance. Within the association, volunteering is presented as a way to put philosophical values into practice and turn them into social action. The study's conclusions can serve as a basis for further justifying the strengthening of volunteer projects: these projects restore people's sense of worth, belonging, and influence, even as the world around them becomes increasingly automated and impersonal. Thus, we will use technology to organize people, resources, and avenues for fulfillment in support of volunteer action. Locating providers, materials, potential partners, etc.

5. "Learning from history" as a framework for educational activities

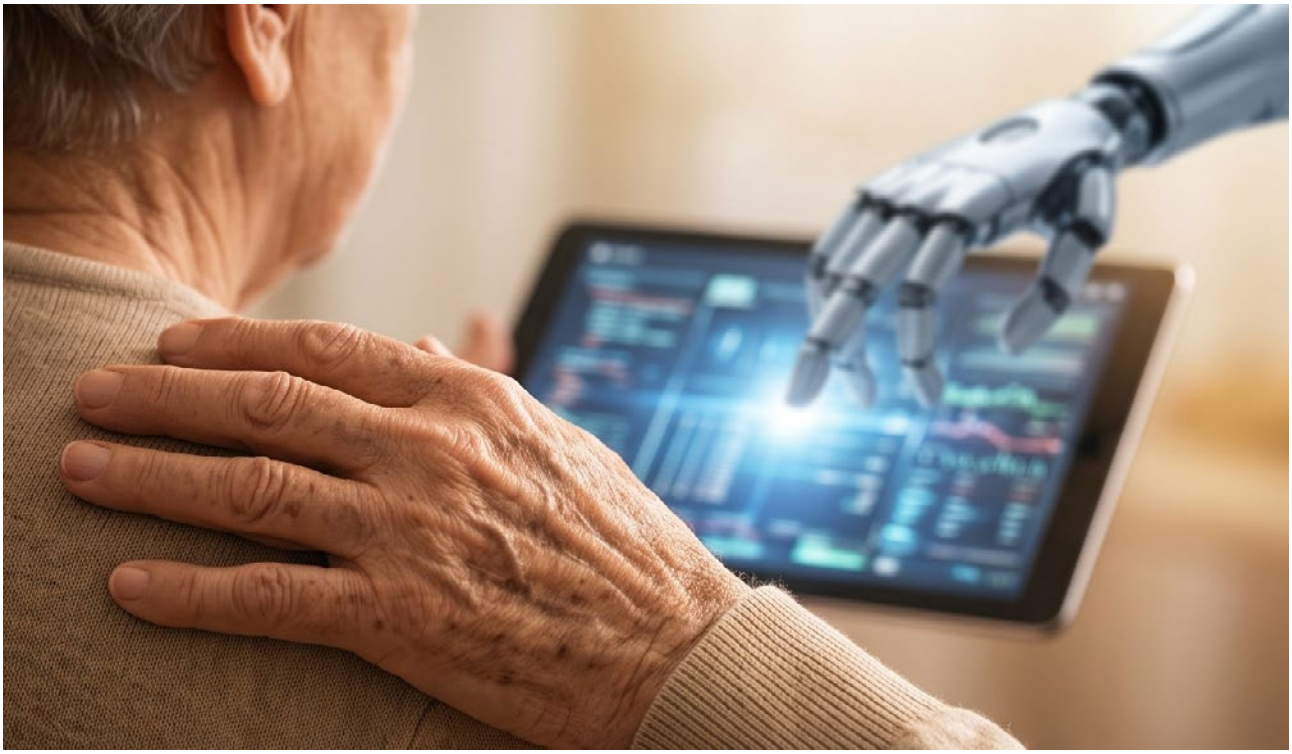
At the beginning of this paper, I raised the question of whether there is greater awareness and experience today in "learning from the past" to reduce harm. This can become an explicit area of study within the organization: courses, talks, and conferences that connect historical technological revolutions with the AI revolution, and that ask what is required of us as thinking individuals, as citizens, and as a community to respond intelligently—and not just instinctively. In this way, we will apply the spirit of philosophy as a way of life to very concrete issues related to work, profession, and identity in our world.

In other words: through technology, we must enhance the means of dissemination, access, and location of valuable texts and information; promote training (through institutes); improve communication management; and ensure a balance among the organization's various lines of development.

Technology cannot replace the human dimension.

Notes

1. https://docs.iza.org/dp10471.pdf
2. https://www.abebooks.com/9781032486246/Technological-Change-Labor-Markets-Routledge-1032486244/plp
3. https://www.economics.ox.ac.uk/publication/1339882/ora-hyrax
4. https://en.wikipedia.org/wiki/Industrial_Revolution
5. https://www.econlib.org/library/Enc/
6. https://www.jstor.org/stable/45183813
7. https://faculty.econ.ucdavis.edu/faculty/gclark/papers/HEG%20-%20final%20draft.pdf
8. https://www.britannica.com/story/the-rise-of-the-machines-pros-and-cons-of-the-industrial-revolution
9. https://eclass.uth.gr/modules/document/file.php/E-CE_U_104/Practical_Problems_in_VLSI_Physical_Design_Automation.pdf
10. https://www.synopsys.com/glossary/what-is-electronic-design-automation.html
11. https://www.coursera.org/learn/vlsi-cad-layout
12. https://www.loper-os.org/pub/ns-cherry.pdf
13. https://www.dol.gov/general/aboutdol/history/chapter3
14. https://www.sciencedirect.com/science/article/pii/S0022199625000212



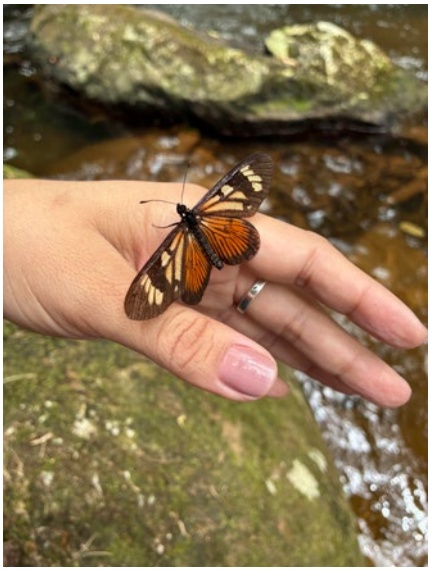
BIOMIMETICS FOR THE STUDY OF AUTOPOIETIC SYSTEMS IN NATURE

Camila Franciele

1. INTRODUCTION

The civilizational model in which we live seeks to dominate, exploit, or "improve" nature, replacing natural systems rather than aligning ourselves with them. Although modern science has expanded our physical senses to unimaginable levels, it remains limited in its capacity to approach our inner human senses. Moreover, science remains largely committed to maintaining the status quo and thus often wastes opportunities to learn from the greatest teacher available: Nature.

It is within this context that biology-inspired design emerges—known as bionics, bio-inspiration, or biomimetics, the latter is understood as an interdisciplinary science that seeks the conscious imitation of the genius of life. It recognizes that Maya, have already solved every problem we attempt to solve in the human world in the multiplicity of her forms, pointing the very manner in which nature establishes relationships, feedback cycles, information exchanges, and finely balanced dynamics of competition and cooperation. Human systems that follow the laws of nature integrate into it without degrading it; we become part of it rather than mere extractors of resources.



To guide this investigation, the concept of autopoiesis, formulated by Maturana and Varela, offers a foundational starting point. Autopoiesis describes the essential characteristic of living beings: their capacity to produce and maintain themselves from within, generating the very conditions necessary for their existence. This perspective reveals an intrinsic relationship between matter and life. Furthermore, it is important to note that such systems are inherently complex and therefore should be understood not merely through their structures, but rather through their relational patterns.

Thus, this work aims to analyze complex autopoietic systems from a biomimetic perspective, seeking to understand how the principles of living organization can inspire a more integrated scientific and philosophical paradigm— more aligned with the fabric of life itself. It also reflects on the meaning of learning from living systems—not merely imitating them—and on reclaiming our rightful place within the natural order.

It is also impossible, within this context, not to consider the presence of the god Hermes, who guides us toward this inner comprehension. If the gods represent facets of a greater transcendent potency, Hermes appears in the complexity of nature: in its intricate compositions, interdependencies, and the dense network of relationships established within and among entire living systems. Complexity itself carries the trace of Hermes in creation, and it is among the central ideas this work seeks to articulate.

2. BIOMIMETICS

Biomimetics is a term crafted from the Greek bios (life) and mimesis (imitation). It constitutes both a scientific and philosophical approach that proposes learning from nature to develop solutions to human issues

that are more efficient, sustainable, and integrated with the environment. Thus, nature is not to be viewed merely as a reservoir of raw materials and becomes understood as model, measure, and mentor for human innovation:

► **Nature as Model:** Human beings may observe natural systems, processes, and structures and imitate them to design solutions to human problems.

► **Nature as Measure:** Biomimetics employs ecological standards to evaluate the adequacy and "correctness" of innovations. Nature knows what works, what is appropriate, and what withstands the test of time.

► **Nature as Mentor:** The essential question becomes not "What can we extract from nature?", but rather "What can we learn from her?"

Janine Benyus points out several recurring strategies and principles found in living systems:

► **Nature runs on solar energy:** Just as the sun powers life, humanity might develop technological and cultural forms based on solar energy. The "pyramid of life" can be seen as a vast organogram of solar energy distribution - Maybe ancient civilizations were not wrong to worship the sun, after all.

► **Nature uses only what it needs:** It is economical and maximizes resource efficiency.

► **Nature adapts form to function:** Instead of assembling parts, nature grows, generating form through integrated processes.

► **Nature recycles everything:** Echoing Lavoisier's famous principle: "In nature, nothing is created or lost; everything is transformed." Elements used in daily-life products have been on Earth since its formation and are employed in cycles. We should value our objects more and extend the most of their usage, reuse or repurpose them; since their elements are rare and difficult to be obtained. Even electronic components we discard so casually contain particles forged in the hearts of ancient stars. Gratefulness is the keyword.

► **Nature rewards cooperation:** Cooperation and competition coexist in balanced proportion to maintain systemic stability.

► **Nature trusts diversity:** The multiplicity of materials, species, and strategies provides experimentation and resilience—teaching discernment, adaptability, and selection.

► **Nature requires localized specialization:** This stands in contrast to contemporary human economic globalization, which depends on long logistical chains, intercontinental transport, dispersed inventory, and massive packaging. The result is a multiplication of environmental and social costs.

► **Nature inhibits excess:** There are no sudden surpluses, unrestrained flows, or stockpiles disconnected from systemic capacity.

► **Nature exploits the power of limits:** Operating within constraints, nature extracts maximum efficiency from minimal resources, repeating and refining patterns toward elegance and optimization. Growth occurs within boundaries—resulting in ecological abundance without self-destruction.

Nature also produces materials of extraordinary intricacy and function, based on form. Some principles that nature uses when choosing how to create something include, but are not limited to:

► **Life-friendly synthesis:** Materials are produced at ambient temperature, in aqueous environments, using light rather than toxic chemicals or extreme conditions.

► **Hierarchical structural complexity:** such as the layered organization of crystals.

► **Self-assembly**: Matter organizes itself; nature does not only manufacture—it induces autonomous ordering from simple components. The elements may be simple, while their organization remains complex through continuous repetition.

► **Strength through flexibility:** enabling systems to withstand variations without breaking.

► **Gradual property transitions:** The components interpenetrate and form a shared matrix, which is an excellent way to prevent structural weak points in a graded material transition.

► **Material combinations that improve:** In materials science, composite structures combine distinct elements to create one composite stronger than their components—an ancient lesson of unity taught by nature herself.

Among the classical examples of biomimetic are: the velcro inspired by the hooks of burrs; cement formulations modeled on coral

skeletons capable of capturing atmospheric CO_2.; the usage of spider silk for its remarkable strength that has inspired industrial and cosmetic applications.; photovoltaic panels: inspired by butterfly wings or even aerodynamic surfaces modeled on humpback whale fins; and many more.

Despite its potential, biomimetics has important limitations. In many cases, current technological capabilities do not allow for faithful reproduction of natural structures or functions. Certain natural solutions remain unreplicable, given the technological resources available.

Furthermore, many biological structures result from evolutionary "tinkering"—context-specific adaptations optimized over historical processes. Thus, natural strategies must be analyzed through disciplines such as biomechanics, biochemistry, paleontology, and ecology to understand the full complexity of the pathways that formed them.

Nature is governed by complex processes: managed not by centralized control, but by countless interactions occurring within the system—such as the blossoming of spring, the choices of millions of consumers, or the relations between predator and prey. In such systems, relationships take primacy over structures. Next, we explore the definition of complex systems and why nature expresses itself in this mode.

3. COMPLEX SYSTEMS

A new worldview emerges, grounded in the understanding of the essential interdependence of all phenomena—whether physical, biological, sociocultural, or spiritual. Systems are complex because they are structured upon relationships. We can understand the universe, therefore, as composed of two dimensions: the "real", measurable by instruments; and the not yet observable, including theoretical entities represented through mental constructs.

Thus, the manifested universe may be conceived as the sum of:

Imaginary (symbolic representation) + Observable Reality (substance)

The imaginary realm represents the dimension in which mental phenomena are modeled, independent of outward physical forms.

Science is moving toward a new perspective capable of recognizing the intelligent order that permeates the universe. This new orientation opens the way to the universe of complexity and eases a spiritual return through the abandonment of anthropocentrism and linear thinking. Such vision exposes the limitations of simplistic explanations—whether reductionist, ideological, or unidirectional.

This new view does not deny mechanistic explanation in the Cartesian sense. Rather, it affirms that mechanistic logic is merely a particular case within a wider spectrum of organizational principles. To the mechanistic worldview, we contrast the complex worldview.

A key understanding of complex systems is that small changes may amplify across the system and produce large and unforeseen effects. This nonlinearity makes it difficult to evaluate the severity of our current actions or predict the consequences of interventions—in economics as much as in ecosystems.

Human beings are not passive observers but participants in the systems they observe and model. Our interpretative activity is itself a form of systemic interaction. Therefore, fully adopting the laws of nature requires actively placing ourselves within them.

Biomimetics and autopoiesis help identify which complex systems and relationships in nature should be studied and incorporated. With that in mind, we now explore the concept of autopoiesis.

4. AUTOPOIESIS

The term autopoiesis was coined from the Greek affix auto (self) and poiesis (making). Thus, autopoiesis literally means "self-making", referring to the autonomy of living systems.

The organization of a living system consists of the network of relationships among its components that characterizes it as a distinct entity. The description of such organization is abstract: it refers to relational patterns rather than specific physical components. Maturana and Varela proposed that autopoiesis represents a general organizational pattern common to all living systems, regardless of the material nature of their components. According to the authors:

"An autopoietic system is organized (as a unified whole) as a network of processes of production (synthesis and destruction) of components such that these components:

(i) continuously regenerate and realize the network that produces them; and
(ii) constitute the system as a distinguishable entity in the domain in which they exist."

This perspective breaks with traditional mechanistic approaches, because living beings are not made of static components stitched together, but by processes that generate the components themselves. A living entity continually produces itself. If these processes cease, the organization disappears. Autopoietic networks persist only because they are constantly renewed—a defining feature of life.

The physical basis of autopoiesis, when considered under thermodynamic conditions far from equilibrium, reveals that living systems operate under an irreducible tension between two opposing requirements:

- ► **Closure:** The system must maintain its identity and autonomy, distinguishing itself from the environment. The membrane filters interactions and reinforces organizational independence.
- ► **Openness:** At the same time, the system must allow the entry of matter and energy from the environment to sustain its internal metabolic processes.

Within this dynamic, the system's boundary—often a semipermeable membrane—plays a decisive role. Moreover, since these two demands are mutually exclusive in their extremes, the organism exists in a permanent paradoxical tension: it must both protect itself from its environment and open itself to it. Life exists as a dynamic equilibrium between: dissolution into the environment, continual self-recreation and adaptation.

Autopoietic systems exhibit two primary types of structural change:

- Renewal, in which degraded components are replaced, preserving organizational patterns.
- Developmental change, in which new structures or connections emerge in response to external perturbations or internal dynamics, transforming the system over time.

A living system's interactions with its environment are fundamentally cognitive. Cognition is not a faculty separate from existence but a continuous enactment of new worlds through the process of living. Maintaining systemic coupling defines the process of knowing: "To live is to know."

Studying autopoietic systems is essential because living systems display far greater reliability than artificial systems. Whereas artificial systems, once built, tend toward depreciation, living systems—despite the fragility of their components—do not merely resist decay: they actively regenerate, expel entropy, and maintain identity and autonomy.

Similarly, the same principles that organize living systems—integrality, interdependence, and continual regeneration—manifest in social systems and ecosystems. These emerge from interactions among organisms and nonliving elements. In such dynamics, complexity does not eliminate uncertainty, error, or disorder; instead, it incorporates them as productive forces that feed self-organization through perturbations and fluctuations.

Nothing should be discarded in the study of complex systems: every deviation, every impact, every anomaly carries meaning and contributes to systemic evolution. Just as autopoietic organisms exist through adaptive, unstable equilibrium, social and ecological systems also depend on the interplay between order and chaos to renew, learn, and transform.

Recognizing this integrative dimension—in which uncertainty and contradiction play constructive roles—strengthens the understanding that life, at every scale, is sustained by processes emerging from the creative interplay between stability and unpredictability.

5. BIOMIMETICS - AUTOPOIESIS - COMPLEX SYSTEMS

In this section, we will analyze where the three concepts intersect, and what we can learn from them. First, we will examine nature as both an epistemological and functional matrix; then, we will explore how it can offer a renewed understanding of human culture; and finally, we will trace the footsteps of Hermes throughout the natural world.

5.1 Nature as an Epistemological and Functional Matrix

To describe nature as an epistemological and functional matrix is to affirm that nature constitutes an immense source of knowledge—a vast repository of principles, patterns, rules, and logics through which we may understand how life solves the problems it encounters. By observing nature, human beings may sense its laws and unveil the principles that govern existence.

Nature also acts as an operational model. The ways plants, animals, fungi, and ecosystems function provide paradigms of energetic efficiency; resource recycling; systemic balance; cooperative stability and adaptability.

These same principles may be applied to human systems such as: economies; industrial production; cities; supply chains; technological design.

In this sense, mature living systems do not merely coexist with their environment—they renew it, contributing to the regeneration and evolution of the whole.

There are numerous natural examples that unify the three key concepts at work—biomimetics, autopoiesis, and complex systems. The most evident example is the living organism itself, such as the human being. Our biological system is complex because it depends on the dynamic, interdependent interaction of multiple subsystems, upon which its development relies. It is autopoietic because it organizes itself autonomously, produces its own components internally, and replaces faulty or decaying elements. At the same time, it serves as a rich source of inspiration for technology and design, exemplifying many paradigms nature employs.

Another powerful example is the human brain, which sustains its organization through cellular renewal and the continuous reconfiguration of neuronal connections. It is complex because it emerges from the interaction of billions of cells, and it has inspired computational models such as artificial neural networks used in machine learning and artificial intelligence.

Similarly, insect colonies, such as ants and bees, exhibit collective mechanisms of organization featuring division of labor, pheromonal communication, and distributed intelligence. These systems have inspired optimization algorithms—including Ant Colony Optimization (ACO)—and robotics.

Cephalopods, such as octopuses and squids, possess distributed nervous systems and self-organized adaptive capacities. They have inspired research on soft robotics and materials engineered to emulate their muscular hydrostat systems, suction mechanisms, and flexible movement.

We could list many other examples within this triad of concepts. Often, nature reuses mechanisms for multiple purposes, applying self-organization as a generative force. Among the countless paths of inquiry across species and relationships, the intersection of these three concepts can serve as a valuable criteria for study.

The key is to imitate nature's tendency toward ecological succession, through which ecosystems mature over time and make increasingly efficient use of spatial, energetic, biological, and relational resources. No matter the problem humanity currently faces, it is almost certain that during billions of years of evolution, nature has already found an elegant, economical, and autopoietic solution. What we need to do is cultivate introspection and attentiveness to learn from these lessons.

Another dimension of recognizing nature as a teacher is the application of its principles to human culture—a subject addressed in the following subsection.

5.2 Nature and Culture

Complexity has always characterized both natural systems—with their vast networks of interdependent relations—and the cosmologies of multiple human societies. In many mythological traditions, the succession of divine generations symbolizes progressive levels of specialization and complexity. At each level of differentiation, earlier elements reappear in renewed forms and functional potentials. Therefore, complexity is not a mere combination of components; it represents the emergence of the new. With each step, new qualities and functions manifest that were previously latent within the system.

Furthermore, numerous traditional societies safeguarded certain landscapes as sacred. Beyond the mystical meaning attributed to them, untouched spaces became living reserves—true sanctuaries of biodiversity. Such protection was not an act of abnegation, but an expression of reverence, a way of allowing nature herself to protect her mysteries and sustain her own continuity.

In our contemporary historical moment, we still refer to the ancestral cultures that maintained deep contact with nature because most of this intimate relationship with the natural world has been eroded. Yet the reflexive dimension remains: the mirror of nature within ourselves. Human beings themselves are complex beings. To incarnate this logic fully, we need to acknowledge our metaphysical uncertainty, systemic unpredictability, and the primacy of relationships over isolated components. From this perspective, to rebuild our connection with nature becomes a cultural reconstruction—through observation, reflection, active reorientation, and free will—guided by a profound sense of integration. Embracing uncertainty opens a way to a renewed, non-reductionist understanding of the divine.

Even where cultural traditions have been disrupted, nature itself

remains—animals, plants, minerals, and entire ecosystems—continuing to offer teaching, wisdom, and symbolic references. We're still able to learn deep cultural values in nature that may transform our human relations, such as generosity, authenticity, sense of belonging, work, among many others. It was common in many cultures to take natural elements—plants, animals, and natural phenomena—to symbolize archetypal figures, much like the lotus—that appears on the cover of this essay—has traditionally represented the disciple.

Since the divine has been a recurring thread throughout this essay, we cannot conclude without addressing the divine dimension of Hermes that has emerged along the way. This will be discussed in the following section.

6. FUTURE PERSPECTIVES

We must recognize that our current historical phase is characterized by mechanical linearity and Cartesian fragmentation; and that it had its relative importance. However, it represented only a particular case of how natural laws operate. Now, a collective maturation is required: to abandon linearity and embrace the complexity of relationships in order to achieve stability. In other words, society must transcend the Cartesian model and move toward a Hermetic pattern of complex systemic understanding.

The most evident message of this study is that nature must be approached as a source of wisdom. Another conclusion is that science should employ the models and strategies of living systems to plan the future, developing transitional structures capable of shifting our current civilizational paradigm before the collapse of the human system as we know it, most likely due to resource exhaustion.

If we succeed in understanding the laws of life and consciously integrating them into human culture, we will be capable of recreating the organizing principles of the Living with awareness. By resonance, this would allow communication with other dimensions of creation, widening the scope of knowledge and experience available to human beings.

Yet, such integration cannot occur without confronting the cultural narratives that currently structure our behavior. One of the most significant insights emerging from the intersection of Biomimetics × Autopoiesis × Complex Systems is that our inherited narratives must change if we are to reintegrate with the natural world. One dominant narrative concerns our notion of success. We have adopted a "global mythology of success" rooted in the mith of equality, which dictate success with maximization of profit, production, consumption and accumulation. This myth unfolds through the belief that that success is synonymous with comfort and is the inevitable endpoint of progress, reinforced by assumptions such as *"Once a certain standard of material consumption has been reached, we must never go back."* Meanwhile our economic and advertising systems are structured around selling - not maintaining, restoring, or extending the useful life of goods. The result is a model rooted in materialism, planned obsolescence, ever-increasing consumption, emotional stimulation, and constant distraction from the deeper work of liberation. This vision must be reexamined. Human beings are not equal —not in gifts, not in vocation, not in destiny— so why should a single definition of success apply to all?

Another narrative inherited from industrial modernity conceives Earth as an infinite warehouse of raw materials or a bottomless pit for waste. Such a worldview normalizes exploitation and frames the depletion of natural capital as an acceptable cost of advancement. To transcend this framework, we must acknowledge that the myth of unlimited progress is flawed. The perpetual pursuit of scalable, linear growth ruptures the law of proportion, replacing human wisdom with technological intensification / acceleration.

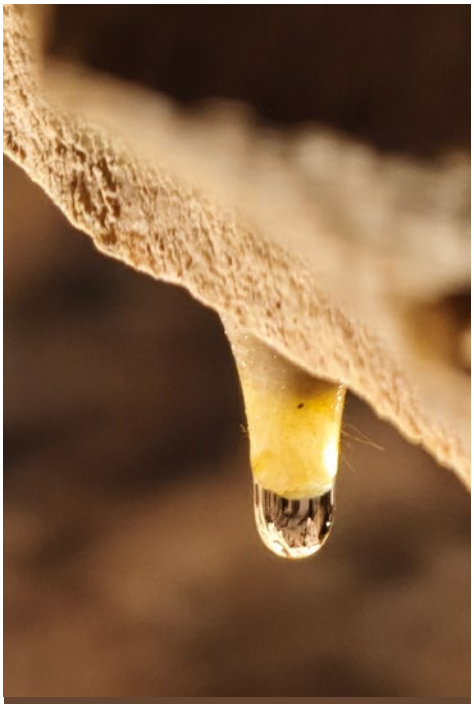
The deep observation of nature suggests new narratives. Living systems teach that structures often perform multiple functions, and adaptation is continuous and essential, and that true cost must include the ultimate price paid by the ecosystem. Humanity must relearn how to attribute real value to things. Returning to our roots —consuming food and resources as nature provides- locally and seasonally— may reorganize our sense of value across essential, secondary and accessory goods, each should be accessed and appreciated in appropriate measure.

A profound narrative transformation also requires understanding that harmony arises through the integration of opposites. This is the shared lesson of autopoiesis, complexity and Hermetic thought:

nothing exists in isolation; everything is woven through exchanges and interactions. Embracing uncertainty —material and metaphysical— is a mark of civilizational maturity. It demands abandoning reductionism and opening space for new forms of

existence, cooperation, and meaning, continually renewed as our symbolic references evolve.

Transforming narratives may appear to be a speculative philosophical exercise, but it is deeply practical. We must redesign how we understand life and how we build social, economic, and technological systems capable of not only of coexisting with natural laws, but ideally working on their behalf, so that nature may in turn work for us.



" This is the shared lesson of autopoiesis, complexity and Hermetic thought: nothing exists in isolation; everything is woven through exchanges and interactions. "

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EDGAR MORIN

(1921 - 2026)

The Legacy of Complex Thought

In a World in Crisis



Edgar Morin,
a light has gone out
(*a great voice has been silenced*)

By Fernand Schwarz, anthropologist, philosopher

This Friday, May 29, 2026, Edgar Morin left us at the age of 104. My thoughts go out warmly to his family and loved ones on the loss of such a significant presence.

I had the honor and pleasure of meeting this generous and open man in the 80s-90s. Our anthropological research and our common interest in Mircea Eliade allowed us to find each other. He did me the honor of co-moderating in 1987 a colloquium on "Man and the City" and of subsequently accepting interviews for publications that I directed, in particular an interview on the need to relearn how to dialogue with myths.

I was deeply marked by his openness of spirit, which made him curious about everything and made him a living example of the unparcelled thought he promoted throughout his life, refusing to stigmatize whoever he was and seeking, on the contrary, to integrate the parts into a single Whole.

The notion of complexity, which he developed extensively in his works, seemed to me essential for understanding the profound nature of reality. It was at the time an intellectual shock, not only in the paradigm of scientific research, but also in the understanding of the human being and societies. Already in 1973, he wrote: "They ring the bells for a closed, fragmentary and simplifying theory of man. The era of open, multidimensional and complex theory begins"[1].

His monumental work, by denouncing closed science and valuing the encounter of knowledge in a spirit of eclecticism, not only introduced a new paradigm of fundamental anthropology, but actually carried out a restructuring of the general configuration of knowledge.

Towards the end of his life, his lucid criticism of the tragic era we live in today did not impede hope. In an article published in 2024[2], he notes that thinking has become blind and that the cli-

mate of violence, uncertainty and the feeling of absence of a future prevent thinking about the whole. "The progress of knowledge is incapable of conceiving the complexity of the real and, in particular, of human realities, which entails a return of dogmatism and fanaticism, as well as a crisis of morality in the wave of hatreds and idolatries."

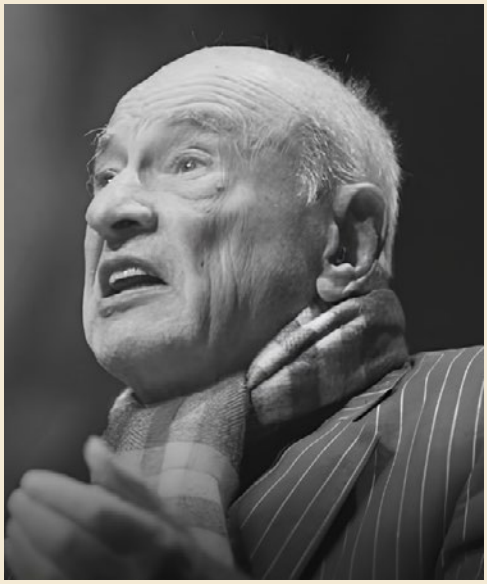
But, at the same time, it reminds us that we potentially have the ability to be fraternal, to come out of a mutilated vision of the other - which consists in seeing in the other only defects and deficiencies, and in attributing to ourselves all the qualities.

His last message reflects the resistance he had all his life. Today it is up to us to enter resistance, starting with the spiritual dimension, which is the source that connects all human beings.

The man has left us, but the legacy remains.

Thank you, Mr. Edgar Morin.

«The progress of knowledge is incapable of conceiving the complexity of the real and, in particular, of human realities, which entails a return of dogmatism and fanaticism, as well as a crisis of morality in the wave of hatreds and idolatries»



Notas

1. Edgar Morin. The lost paradigm: human nature. Point Seuil, 1973.
2. Article by Edgar Morin, "The progress of knowledge has provoked a regression of thought," published in Le Monde, January 22, 2024.

Edgar Morin,
a thinker without borders

By Isabelle Ohmann

One of the great minds of the century has left us this May 29, 2026, at the age of 104. A world-renowned sociologist, philosopher and humanist, Edgar Morin refused throughout his life to be pigeonholed in any chapel, developing throughout his existence an open and innovative thought.

Doctor honoris causa by thirty-eight universities around the world, known as the philosopher of complex thought, Edgar Morin tirelessly tried to build bridges of dialogue between knowledge, arts, science, politics and philosophy through an eclectic approach, breaking with Cartesian and reductionist thinking.

A committed youth

He was a committed man, although he rejected this term and preferred to consider himself "devoted to a cause"[1]. In a century of life, he wrote: "My humanist culture made me worry, since adolescence, about the fate of humanity." Hungry for knowledge, he related: "I began to study, not to have a trade, but to know what human destiny was made of"[2]. This humanistic search is reflected throughout his works, composed of more than a hundred books translated into dozens of languages on issues of society, education, knowledge and civilization.

In his youth, between the horrors of Nazism and those of communism, he leaned towards philosophers who sought a third way, such as Simone Weil or Emmanuel Mounier[2]. The influences in his life were innumerable, but he assumed that form of freedom that consists of not belonging to any ideology, distrusting any dogmatic approach: "I take sides trying not to be partisan". Thus he was one of the first French intellectuals to criticize the Stalinist line of the communist party he had joined, which led to his expulsion in 1951.

The complexity thinker

His thinking focuses mainly on the notion of complexity, which he first formulated in Science with Conscience (1982). It defines "complexity" from the Latin complexus, "that which is woven together."

In the 2000s he founded the Association for Complex Thinking. "While fragmentary and dispersed knowledge makes us increasingly blind to our fundamental problems, the intelligence of complexity becomes a vital necessity for our people, our cultures, our societies," he wrote on the occasion of a colloquium organized by the Association.

His curiosity led him to cover all disciplines, but his erudition - which was reminiscent of the

Encyclopédie - far from being a simple accumulation of knowledge, was at the service of a true interdisciplinarity. This multidisciplinary and transversal approach sought to broaden a vision that, thanks to its multifactorial dimension, allows us to unveil new dimensions of reality.

The method

One of his major works was "The method", an encyclopedic work in six volumes whose writing lasted for more than a quarter of a century. For the author, it constitutes the attempt to elaborate "the way" – or "the Tao". It proposes a method to cross approaches and connect their knowledge. This is one of the axes of his great work: complex thinking or "how to connect a priori irreconcilable elements, how to decompartmentalize the knowledge that is naturally connected in nature".

In an interview, he stated: "The whole point of The Method is to break down compartmentalization. Human knowledge is divided, compartmentalized, and scattered. The best example of this fragmentation? Knowledge about humanity, fragmented across the humanities and social sciences, among others. Cosmology is also a repository of this, since we are the heirs to the primordial particles of the cosmos. Biology deals with our animal nature, which is inseparable from our human nature, just as the brain is inseparable from the mind. The problem lies in connecting all these fragments"[5].

The "good method," according to Edgar Morin, consists of developing a way of thinking that takes the unpredictable into account in order to integrate the complexity of phenomena. "The enemy of complexity is not simplicity; it is mutilation," writes Edgar Morin[6]. He continues: *"Mutilation can take the form of one-dimensional conceptions or reductionist conceptions. Mutilation occurs when all reality and all meaning are denied to what has been eliminated..."*[3].

A Vision of the Future

As early as 1972, in the wake of the Meadows Report - which revealed the degradation of the biosphere due to techno-economic progress and the thirst for profit - he sounded the alarm, pointing to the modern cult of progress and the industrial and technological revolution, which today are leading us toward serious ecological problems and the depletion of resources.

Several works followed, such as The Outlines of Earth-Homeland in 1993, and later, Year 1 of the Ecological Era: The Earth Depends on Man, Who Depends on the Earth*[4], in which Edgar Morin emphasizes the need to promote a "politics of civilization" that "seeks to put humanity back at the center of politics and promote good living rather than well-being".

"The idea of development must be repositioned within a natural, historical, social, and cultural context. But we still lack an awareness of a shared earthly destiny. We must foster the emergence of human solidarity grounded in a fundamental bond among people—the idea of 'earth-homeland,' for example," he also wrote (4).

Concerned about the danger that multiple crises pose to humanity (ecological, health, economic, political, intellectual crises…), he issued repeated warnings and published several manifesto-style books, including Let's Wake Up!

"The current trajectory is catastrophic. Today, regressive processes of all kinds are multiplying, and the dangers of destruction are increasing. But when a system is incapable of addressing its vital problems, it either disintegrates or manag-

es to generate within itself a metasystem capable of solving its problems. A metamorphosis then takes place. The great planetary crisis we are experiencing heralds either a great regression or a possible metamorphosis. Every metamorphosis is invisible before it occurs. But one can glimpse currents moving in that direction" [4].

However, as a true philosopher, he explained that this metamorphosis could not take place without a metamorphosis of humanity itself: "It is not enough to resist external barbarism, where cruelty and hatred stemming from the depths of history ally themselves with the cold barbarism of calculation and technology, which tends to impose itself on our society; we must also resist the inner barbarism within each of us. We must cultivate a true psychological culture that includes self-examination and self-criticism, resistance to the egocentric tendency to justify ourselves and to project evil onto others"[5].

This clarity was underpinned by a steadfast hope. "We must leave behind the best of all possible worlds, but hold out hope for the possibility of a better world. I have always believed in the improbable, in the realization of the improbable in human history," he asserted. "We are only at the beginning of a new adventure. Every innovation, every creation begins with an extremely marginal deviation, sometimes concentrated in a single individual, which, if it manages to survive and spread, eventually becomes a historical force"[5].

Beyond his immense intellectual stature, we will remember him as a courageous man who offered his support to our association during a time of crisis, and he will forever remain for us the example of a philosopher loyal to his ideas until the end of his life.

Notes and references:

1. "Intellectual of Globality and Global Thinker"—interview in "Le Nouvel Obs" on February 27, 2022 https://www.nouvelobs.com/idees/20220227.OBS55036/edgar-morin-suis-je-le-dernier-des-dinosaures.html) founder of the movement and of the magazine "Esprit."
2. Le Monde May 30, 2026.
3. Published in 2007 (by Tallandier).
4. Article published in UNESCO's "El Correo" https://courier.unesco.org/fr/articles/esperer-en-cherchant-linespere?fbclid=IwVERDUASIDwFleHRuA2FlbQIxMABzcnRjBmFwcF9pZAwzNTA2ODU1MzE3MjgAAR6djBPCPayVGaVaXO3nRa79o0RtcDV37lfPh4pbS_bt4r6vePyVB0mHmfSxPQ_aem_YWdncwCpbwWAgLyyF8j4dagG4XH7.
5. In an interview published in "Le Nouvel Observateur", No. 2091, on Thursday, December 2, 2004: https://www.nouvelobs.com/idees/20210707.OBS46212/edgar-morin-tout-le-travail-de-la-methode-c-est-de-decloisonner.html).
6. In Messie, mais non (in Arguments pour une méthode, Seuil, 1990).

INTERVIEW WITH EDGAR MORIN

RELEARNING TO DIALOGUE WITH THE MYTHS

Fernand SCHWARZ: You knew Eliade before he died, in Chicago...

Edgar MORIN: Yes, that man whose work I knew, I only treated him personally a few days before his death, in Chicago, thanks to I. P. Couliano. He was at the University of Chicago for a few days; Eliade was depressed that his library had burned down, but the idea of dining together seemed to have pleased him; it was his first outing in a long time. He took us to the restaurant, along with his wife.

To me, Eliade was not just a mythologist, but a true myth. I discovered Eliade - I would say a little by chance, looking at the National Library files - when preparing my first work on "Man and Death", to reflect on the mythologies of death. When I came across one book of Eliade, I took another; then, another; in short, all those that existed at the time, and I nourished myself on Eliade. To me he was a person who existed outside of time and outside of space. Knowing that I was suddenly there, in Chicago, a few hundred meters from my home, was an incredible impression. Although I was already quite old, I went to Eliade's house with a very childish impression. When I returned, I would say to anyone who would listen, "I had dinner with Eliade." It was an event; I was happy. With unprecedented brutality, a few days later, I learned from the newspaper of the death of Mircea Eliade, a man I had found full of life. When you see older people with such vitality, the main thought is not that they are very old people, close to death, but that you have the feeling that they are immortal. That's what that meeting was like.

F.S.: Was it Eliade who revealed to you the depth of the myth?

E.M.: When I started my work on death and on human conceptions of death, there was no special literature on this subject at that time. Therefore, I was forced to explore very broadly in human geography. For me, writing that book was an intellectual "journey"; it was a period in which I spent every day in the National Library; I had the opportunity to read or reread Sir James Frazer, for example; and, in those readings so diverse that encompassed anthropology, history or the history of civilizations, one had to find what concerned death. And I found in Eliade someone who thought the myth both in its fundamental unity and in its diversity. He is the first thinker of the mythological phenomenon in its universality, in its richness and in its cosmological character. Eliade's position was theoretically multidimensional, as

well as transdisciplinary and indisciplinary. Moreover, to be transdisciplinary, one must be indisciplinary.

Incidentally, I was surprised to learn in Chicago that Eliade's work, despite being endorsed by prominent French academics, had been dismissed and ignored. Such is the fate of pioneers. Today, for example, there is much talk of Dumézil, but that has only been the case in the last few years of his life. At the beginning of his career, he was considered a joker. There is an entire aspect of Eliade's work that I am unfamiliar with - his fiction -but I can clearly sense that richness of thought that needs to be expressed on different levels. As soon as one seeks to address the human condition, there is, of course, the entire dimension of the humanities, but the novel captures something human in all its uniqueness, in all its complexity - something not found in even the most beautiful treatises, whatever they may be. To question the very depths of humanity, Eliade had to write his novels.

F.S.: For Eliade, poetics was the preferred language of dialogue and communication among beings; that is why he was interested in myths and symbols. You must agree with that...

E.M.: Not only do I agree, but I also believe that the distinction between poetry and prose exists not only in literature but also in life. Our life is an alternation or a blend of prose and poetry. Our poetic moment is the moment when we express our subjectivity, our very being - when we understand ourselves and others, and when we are in a profound relationship with the outside world. We need the prosaic, just as we need tools, paper, objects… But even in something as prosaic as eating, we reintroduce the poetic into gastronomy and into our shared experiences. Therefore, the poetic dimension of life is a fundamental one.

DEATH MAKES US HUMAN

F.S.: Is the integration of the phenomenon of death a factor in humanization rather than simply in hominization?

E.M.: Yes, that is the central thesis of my book Man and Death, which was confirmed by the major prehistoric discoveries of the 1960s. Man's official identity is homo faber - the tool. However, there is a second defining characteristic: man does something that no animal does, which is to create myth - and notably, the myth of life after death. Myth exists not only to fill the void of death but also to fill the mystery of life. It is clear that the myth of death is the phenomenon that distinguishes man from animals.

When I wrote The Lost Paradigm: Human Nature, new evidence had already emerged to show that hominization is a process that began several million years ago and unfolded with Homo erectus, perhaps a million years ago. Later, the Neanderthal deceased - now a "sapiens" - buried in a fetal position (buried to be reborn), or the deceased whose bones are painted, accompanied by food and weapons, as if he were to lead another life in the afterlife, are signs of this humanization. The two great myths of death - namely, the "ghost," the double, the specter that will survive, and rebirth - are only recognized beginning with Neanderthals. Perhaps something will be discovered between Neanderthals and Homo erectus... But it seems clear that as soon as what we might call "humanization" - in relation to "hominization" (the technical process through

which culture is created) - emerges, and as soon as our language appears - a language capable of expressing concepts, ideas, and emotions, and one that enables consciousness, that is, a dual relationship with ourselves - at that very moment the issue of death arises, both as anxiety and as a response. Death is, therefore, a theme of humanity.

F.S.: Let's now turn to Eliade's perspective. Do you agree with the statement that, from the moment one becomes aware of death, there is an irruption of the sacred or an awakening to the sacred?

E.M.: Certainly. I have defined the emergence of the theme of death as a threefold anthropological phenomenon. First, there is a mental and social trauma - that is, death emerges as a threat, and even as a threat of contagion. The second aspect consists of the rites designed to ward off or contain the threat or the mourning; the third is the mythological response to death.

Within this threefold phenomenon, rituals emerge selectively as constitutive elements of the sacred. Here, too, I believe we live in a permanent and contradictory sacred/profane duality. The sacred is not found only in magical rituals or religions; we find it in our seemingly profane lives.

In France, we lived under a rationalist anthropology for a very long time; it was thought that all these manifestations of the sacred (myths, rites, symbols...) were appropriate for archaic populations, for "primitives,"for childlike populations, or for very backward civilizations where people had not had the opportunity to become acquainted with Western rationality. But as soon as Western rationality emerged, with its positive and scientific spirit, the sacred vanished entirely. However, it eventually became clear that myth was re-entering the very concept of reason and the concept of science in a terribly abstract and invisible form.

Eliade's work, which restores the importance of the sacred, emerged in France at a time when minds were not prepared for it. Not only were minds confined to their own disciplines and unwilling to accept this planetary and cosmic attempt to conceptualize myth, but they were also unprepared to recognize the profound and contemporary truth conveyed by Eliade's message. And the deeper we delve into the world of complex thought - which recognizes that we are woven from the sacred and the profane, from prose and poetry - the more Eliade's thought will appear to us as absolutely indispensable.

THE SACRED ALLOWS US TO EXPERIENCE PARADOXICAL PHENOMENA

F.S.: Eliade insisted that the sacred is an irreducible reality of human consciousness, regardless of the era. "Transcending the limits of the human condition through the experience of paradoxical phenomena" - this is how he redefines the sacred at a certain point, as the capacity to experience paradoxical phenomena and to go beyond one's own limits. It is not, of course, the sacred in the sense of the catechism...

E.M.: For me, the sacred stands out as a fundamental anthropological category; to define it would be to reduce it. Translating it into other languages is, in a way, to dissolve it. On the other hand, paradox is an abso-

lutely normal phenomenon as soon as we enter the unknown or the mystery of things.

Conversely, if we remain within the triviality of phenomena clearly circumscribed in time and space, then it is possible to live without paradoxes. But as soon as we encounter something complex, there is a paradox. For example, not only is the part contained within the whole, but the whole is also contained within the part. This paradox is the reality of the hologram, where every point of the hologram contains the entirety of the information about the object it represents. This is also true for every cell in our body, which contains the entirety of the genetic message, or for every member of a society, who embodies the whole of that society within themselves. As soon as we question the deepest aspects of reality, we encounter paradoxes or contradictions. Thought must not be afraid of these paradoxes; it must recognize and confront them, even if it cannot overcome them. It is perhaps these areas of paradox and mystery that give rise to the sacred.

F.S.: The challenge is to link reason and imagination. What, in your opinion, is the relationship between myth and the systemic approach? After all, a myth is a holistic approach...

E.M.: In the work I have not yet published - which is part of my study on The Knowledge of Knowledge - I examine myths as systems of ideas, as organizations. This is by no means the so-called structural approach - which is entirely valid - nor is it a linguistic approach; I attempt to show that myths are not merely organized phenomena, but organized phenomena endowed with life. A myth, like a god or a doctrine, is produced by the minds of a human community, but as soon as it is produced, these minds become, in a certain sense, its nurturing environment, and the myth acquires a certain autonomy, a relative self-organization. Since everything that exists is self-eco-organized, we ourselves, without our environment, die. We nourish our myths, but they possess a certain autonomy from us. They can command us, give us orders.

F.S.: In traditional societies, one way of dealing with the paradox is, for example, through rites of passage, but today, how can we better explore and immerse ourselves in the paradox?

E.M.: Initiation or rites of passage bring about a cultural transformation - that is, they transform a child into an adult. These rites involve trials. In our society, this transition does not take place in such a drastic way, nor at such a young age. A distinct period – adolescence - has been established, and initiations now take place differently. Sexual initiation on the one hand, initiation through military service on the other, initiation into a professional career… and finally, there are people who are never initiated into life at all.

This poses a problem because, for all the major moments in human existence - whether individual or collective - a ritualistic dimension linked to the sacred is essential. The study of neuroses shows that the neurotic creates personal, individual rituals that have absolutely no practical purpose, but which he needs to perform before going to bed or before carrying out a certain act… In other words, we set aside the private rituals we need. These distinctions are not merely logical; human beings also need to make ri-

tual and existential distinctions.

I believe we suffer because we can no longer adhere to the ancient rites of religions - except for religious beliefs; we are incapable of conceiving of rites or creating new ones. There have been very naive and ridiculous attempts, such as during the French Revolution with the cult of the goddess Reason; but there are also national rites, patriotic rites, and republican rites. Of course, they often take on a tedious form; for example, in a ritual speech at an academy or university, or in the introduction of a speaker, the entire powerful and sacred aspect of the ritual disappears in favor of boredom; the ritual is degraded, loses all sacredness, and becomes pure bureaucratic conformism. Perhaps we need to immerse ourselves once again in ancient rites, in our roots, as Eliade proposed.



MODERN MAN IS ORPHANED FROM THE SACRED

E.M.: We feel orphaned; we must relearn how to reconnect with mythical structures. We have lost the ability to engage with myths, as Eliade so aptly pointed out. The problem is not to suppress myths or religion, but to engage in dialogue with myths, to have a new kind of religion that connects us to one another, one that embraces the mystical and sacred dimension of existence; because our non-mystical and non-sacred side must engage in dialogue - our consciousness and our rationality must engage in dialogue with this sacred dimension. This is not anti-rationality; on the contrary, rationality serves to engage in dialogue with the non-rational part of ourselves: it is absolutely irrational to say that one can lead a rational life.