

# **The Cosmological Mind**

*Toward a Critique of Cosmological Reason*

By

**Heitor Matallo Junior**

**The Cosmological Mind: Toward a Critique of Cosmological Reason**

**By Heitor Matallo Junior**

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# Preface

This book did not arise from a fascination with the universe alone, but from a growing unease with the way modern thought has learned to speak about it.

Over the last century, cosmology has transformed our image of reality with unprecedented speed. We have learned that the universe is expanding, that space and time are dynamic, that the observable cosmos is only a fragment of a vastly larger structure, and that the fundamental laws governing this structure are inseparable from mathematics of extreme abstraction. Yet as our models grew more powerful, something subtler began to fracture: our confidence that understanding the universe is merely a matter of extending calculation.

The *Cosmological Mind* begins from this fracture. What this book does with that fracture—critically, architectonically, and systematically—is the task of the chapters that follow.

It takes seriously the suspicion that contemporary cosmology is not merely revising our picture of the world, but quietly reshaping the very structure of reason that seeks to comprehend it. Singularities, horizons, inflation, multiverses, undecidable limits—these are not only physical concepts. They are signs that cosmology has entered a domain where explanation encounters its own boundaries, where meaning is no longer exhausted by law, and where interpretation becomes unavoidable.

The central claim of this book is simple, though its consequences are not: cosmology has become a hermeneutic enterprise.

This does not mean that cosmology abandons rigor, nor that physics dissolves into metaphor. On the contrary, it means that the most rigorous theories of the universe now expose the interpretive conditions under which they operate. Just as Kant showed that reason must reflect on its own limits when it seeks totality, modern cosmology reveals that the universe itself can be understood only through frameworks that are intrinsically incomplete, horizon-bound, and open-ended.

The “cosmological mind” names this condition. It refers not to a cosmic consciousness, nor to a metaphorical intelligence imprinted upon nature, but to a historically emergent mode of understanding—one shaped by inflationary time, relativistic space, quantum indeterminacy, and mathematical infinity. It is the form of rationality that arises when thought confronts a universe that no longer presents itself as a closed totality, but as a generative, plural, and structurally inexhaustible field.

Throughout this work, I argue that the limits encountered by cosmology are not failures to be eliminated, but structural features to be interpreted. Singularities mirror Gödelian incompleteness; cosmic horizons replay the Kantian distinction between phenomena and noumena; the multiverse transforms necessity into plurality; inflation turns origin into process. In each case, the universe reveals itself not as a finished object, but as an unfolding text whose meaning depends on the interpretive acts through which it is approached.

This book therefore stands at a crossroads. It speaks to philosophy, because it revisits the fate of reason after Kant under radically new cosmological conditions. It speaks to physics, because it takes seriously the conceptual and epistemic implications of its most advanced theories. And it speaks to the humanities more broadly,

because it treats understanding itself—rather than calculation alone—as the central problem of cosmology.

The Cosmological Mind is not a manual of cosmological models, nor a speculative metaphysics detached from science. It is an attempt to articulate a critical framework adequate to a universe that exceeds every attempt at closure. Its ambition is neither to reconcile science and philosophy artificially, nor to subordinate one to the other, but to show that, at the limits of knowledge, they converge.

If this book has a guiding intuition, it is this:

*the universe is intelligible not despite its openness, but because of it.*

To think cosmology today is to accept that reason itself expands with the cosmos it seeks to understand—and that interpretation is not an afterthought, but the very medium through which the universe becomes thinkable.

What follows is an exploration of that medium.

## Editorial Note:

# A New Rationality of Reading

This volume begins in an unusual place. Instead of moving directly into the exposition of the *Critique of Cosmological Reason*, the reader first encounters a constellation of seven texts. Their purpose is not to summarize the book, nor to present a system in miniature, but to prepare the reader for the portal through which the Critique must be approached.

Book I does not constitute the portal itself. Rather, it provides the conceptual orientation required to reach it. As in certain prefaces by Michel Foucault, or in the structural labyrinths imagined by Umberto Eco, the explanatory framework is placed before the argument rather than after it. The reader is invited to enter not the doctrine itself, but the conditions that render the doctrine intelligible.

The logic of this arrangement is simple. In cosmological reflection, misunderstandings arise before understanding does. Concepts such as limit, infinity, intelligibility, anthropomorphism, symbolic form, and transcendental structure must be clarified in advance if the Critique is to unfold without conceptual distortion. The texts gathered here therefore function not as conclusions, but as instruments—as lenses through which the unfolding system becomes readable.

In this sense, Book I is a map rather than a territory, a preparation rather than an origin. It orients the reader toward the hermeneutic portal that the main body of the book will open more fully. Only after this preparation can the *Critique of Cosmological Reason* proceed along its intended trajectory: rigorous, reflective, and cosmologically grounded.

## Author's Note on the Use of AI Tools

This book is the result of the author's original research and conceptual work.

Artificial intelligence-based tools were used selectively and exclusively for purposes of language translation, stylistic refinement, and grammatical correction. No arguments, conceptual structures, or interpretive claims were generated by automated systems.

All philosophical positions, analytical decisions, and theoretical developments presented in this volume are the sole responsibility of the author.

# A Priori Forms for Reading This Book

Table 1: A Conceptual Compass for the Critique of Cosmological Reason

<p><b>1. Transcendental</b> Not mystical or idealist: the conditions that make understanding possible. Here, the transcendental evolves with science.</p>	<p><b>11. Cosmic Horizon</b> The maximum distance from which light reaches us. The visible boundary of the universe.</p>
<p><b>2. Hermeneutics</b> The art of interpretation. How meaning arises from what we observe.</p>	<p><b>12. Historical Conditions of Knowledge</b> What can be understood depends on the time, tools, and frameworks available.</p>
<p><b>3. Horizon</b> The moving boundary of what can be known. As knowledge grows, the horizon expands.</p>	<p><b>13. Invisible Phenomena</b> Entities not seen directly but inferred from effects (dark matter, quantum vacuum).</p>
<p><b>4. Limit</b> What defines the form of something. Without limits, nothing becomes intelligible.</p>	<p><b>14. Structure</b> An organized pattern that makes comprehension possible—whether a theory or space-time itself.</p>
<p><b>5. Conditions of Intelligibility</b> The factors—conceptual, historical, technological—that allow something to make sense.</p>	<p><b>15. Scientific Interpretation</b> Turning data into meaning. Science is more than calculation.</p>
<p><b>6. Finitude</b> Our perspective is limited. This is not a flaw but what makes knowledge possible.</p>	<p><b>16. Models</b> Simplified representations of reality. Useful tools, not the world itself.</p>
<p><b>7. The Infinite (as a Guiding Idea)</b> Not something achieved, but something that orients inquiry. A direction, not a destination.</p>	<p><b>17. Appearance and Reality</b> What seems to be versus the underlying structure science uncovers.</p>

<p><b>8. Antinomy</b> A conflict between two valid ideas. Reveals the limits—and power—of reason.</p>	<p><b>18. Symbolic Form</b> Cassirer’s idea that understanding occurs through symbolic systems: science, language, art, math.</p>
<p><b>9. Interpretation</b> The transformation of raw information into meaning. Every science is interpretative.</p>	<p><b>19. Hermeneutic Conditions of Science</b> How concepts, instruments, and frameworks shape. what counts as “real” in physics.</p>
<p><b>10. Observer</b> The one who measures or perceives. In modern physics, the observer participates.</p>	<p><b>20. Historicity</b> Everything changes—concepts, theories, and even the conditions of knowledge.</p>

# General Introduction: Toward a New Architecture of Reason in an Expanding Universe

To attempt a *Critique of Cosmological Reason* today is to revisit the Kantian project under conditions that have changed almost beyond recognition. Kant wrote for a universe that was, in essence, Newtonian: spatially homogeneous, temporally uniform, geometrically Euclidean, and empirically vast yet conceptually domesticated. The cosmos that confronts us now is different in kind, not only in scale. It expands, curves, cools, inflates; it harbours quantum fields, dark sectors, singularities, horizons, and mathematical infinities that penetrate directly into physical theory. Under such conditions, the very question “*How is cosmological knowledge possible?*” demands a new critical answer.

This book proposes that answer not by abandoning the transcendental gesture, but by extending it. Kant’s decisive insight—that reason must investigate the conditions of its own validity—remains intact. What changes is the arena in which that investigation unfolds. The transcendental can no longer be conceived as a fixed, ahistorical scaffolding of cognition. It has become inseparable from the languages, instruments, models, and symbolic forms through which an evolving universe is rendered intelligible. Cosmology today is not only about what there is, but about how the very *possibility* of a “*universe*” is structured by our forms of representation.

The *Critique of Cosmological Reason* is therefore not a new metaphysics of the world, but a critique of the ways in which the world becomes an object of understanding at cosmological scales. It asks how a

finite, historically situated mind can think expansion, plurality, singularity, and infinity without collapsing into dogma on one side or mysticism on the other. The answer, developed across the seven Books of this work and anticipated in Book I, is that cosmological reason must be both expanded and disciplined: expanded to match the conceptual reach of contemporary physics, disciplined to remain faithful to the conditions of intelligibility that make physics itself possible.

The architecture of the book reflects this double demand.

**Book I** functions as front door to cosmological hermeneutic a priori. Its seven chapters do not offer a mere prologue; they reconstruct the historical life of the transcendental, map the conceptual landscape the reader is about to enter, and defend the project against predictable misreadings. Here, the “*a priori*” appears not as a timeless essence, but as something that has a history—from ancient notions of cosmic order, through Kant’s critical turn, to the hermeneutic and cosmological horizons of the present. The essays clarify what it means to speak of *forms of meaning* across physical, biological, cognitive, and cultural levels; they distinguish structural reflexivity from cosmic anthropomorphism; they trace the passage from transcendental subject to scientific observer; and they outline the methodological commitments—fallibilistic, relational, multi-level—on which the entire *Critique* rests. Book I thus equips the reader with the conceptual instruments required to cross the threshold into cosmological critique.

**Book II** establishes the methodological foundations. It begins with the *risk of every future metaphysics*: the temptation to turn speculative cosmology into disguised theology or post-empirical dogma. From there, it proposes a hermeneutic post Kantianism in which the mind is understood not as a mirror of nature but as a medium of

interpretation. The trajectory from Cohen to Cassirer is reconstructed as the backbone of a cosmological critique, showing how symbolic forms and historical understanding replace a rigid a priori with a dynamic grammar of meaning. The book closes by arguing that Kant's architecture, while indispensable, is no longer sufficient: a universe of relativity, quantum fields, and cosmological plurality requires that we move from fixed limits to shifting horizons.

**Book III** turns to the historical foundations of cosmological reason. It traces how the medieval inheritance of the infinite, the Kantian discipline of finitude, and the later emergence of horizon-thinking prepare the ground for a cosmological reformulation of critique. From the Greek invention of limit to the scholastic synthesis, from Kant's doctrine of the unknowable to hermeneutic reason in Cassirer and Gadamer, this book shows that the conditions of intelligibility have always been reshaped by changing images of the cosmos. The transcendental is revealed as historically articulated rather than frozen once and for all.

**Book IV** explores the boundless dialogue between reason and infinity. It follows the transformation of the infinite from Renaissance cosmology (Cusa, Bruno, the Copernican turn), through Enlightenment optics and metaphors of light, into the mathematical revolutions of Cantor and Gödel. Infinity appears here as both a disturbance and a resource: it destabilizes inherited forms of completeness, yet forces the invention of new symbolic and logical structures. Thermodynamics, relativity, and modern cosmology then reintroduce infinity as a physical magnitude—linked to energy, entropy, and expansion—demanding a hermeneutics of the infinite in which completeness and totality become problems for interpretation rather than for dogmatic resolution.

**Book V** develops an ontology of cosmological plurality. It begins with space-time as the primary form of manifestation: a geometry through which existence unfolds as curvature, expansion, and causal structure. It then turns to the multiverse, not as a ready-made solution, but as a test case for the limits of explanation when plurality is radicalized. Quantum horizons, the relativistic mind, and the cosmology of the invisible (dark matter, dark energy, vacuum fluctuations) show how absence, probability, and perspectival structure become central to any contemporary ontology. Being, in this context, is what can appear under the constraints of relativity, quantum theory, and observational mediation.

**Book VI** shifts the focus to reason and the infinite mind. It examines how the observer becomes a structural component of manifestation; how time, consciousness, and cosmogenesis intersect; how telescopes, algorithms, and equations function as extensions of intuition; and how the universe *“reflects itself”* in the strictly epistemic sense that it produces within itself the conditions for its own intelligibility. Mind is neither the secret of the cosmos nor a mere epiphenomenon; it is one of the horizons through which the cosmos acquires form.

**Book VII** returns to the metaphysics of boundaries. It articulates a logic of the limit in which finitude is rediscovered as the precondition of truth; revisits Kant’s antinomies as living structures within modern cosmology; and asks whether new antinomies arise at the frontiers of quantum gravity, inflationary scenarios, and the mathematics of the continuum. Here, horizons, singularities, symmetry breaking, decoherence boundaries, and cosmic scales are interpreted not as failures of theory, but as the grammar through which the universe stabilizes meaning. The limit ceases to be the end of thought and becomes its most refined instrument.

## The Architectural Logic of the Seven Books

Taken together, the seven Books of this work do not form a linear sequence, nor do they simply accumulate arguments. They constitute an architecture in the strict critical sense: a structured articulation of distinct yet interdependent functions through which cosmological reason becomes intelligible to itself. Each Part responds to a specific task—orientation, methodological vigilance, historical grounding, confrontation with infinity, ontological reconfiguration, cognitive reintegration, and the rearticulation of limits—but none of these tasks can be fulfilled in isolation.

The order of the Books is therefore neither arbitrary nor merely pedagogical. It reflects the necessity of moving from the conditions under which cosmological questions can be meaningfully posed, through the historical and conceptual pressures that reshape those questions, toward the point where reason encounters its own boundaries within the universe it seeks to understand. What begins as an inquiry into the conditions of intelligibility gradually transforms into an examination of being, mind, and limit, revealing critique itself as a dynamic process rather than a fixed tribunal.

In this sense, the architecture of the work mirrors its central thesis: that reason does not stand outside the cosmos as an external judge, but unfolds within it as a structured, fallible, and historically evolving capacity for understanding. The seven Parts thus form not a closed system, but an open critical configuration—one that prepares the ground for the concluding reflections of the Epilogue, where the trajectory of the critique is gathered and reflected upon as a whole.

The Epilogue gathers these threads and looks forward. It argues that the destiny of a *Critique of Cosmological Reason* is not to close the system but to keep the conversation open between cosmology and

philosophy, science and hermeneutics. The infinite is no longer treated as an object of faith or a metaphysical comfort, but as a test of coherence that reason imposes upon itself. The future of cosmological reason will depend less on enlarging our catalog of entities than on deepening our understanding of the forms, horizons, and limits that make any catalog meaningful.

Placed before this introduction, the brief section on *A Priori Forms for Reading This Book* offers the reader a set of orienting concepts: how to move across Parts that are historically, conceptually, and scientifically dense; how to read the work either linearly or thematically; and how to keep in view the distinction—central to the entire project—between describing the universe and describing the conditions under which the universe can be described.

Taken as a whole, the *Critique of Cosmological Reason* does not present a finished system. It proposes a discipline: a way of thinking that keeps pace with an expanding universe without sacrificing rigor to fascination or skepticism to resignation. Its stake is that cosmology and philosophy, far from belonging to separate realms, share a common horizon. The universe demands interpretation; reason becomes adequate to it only when it understands that its own forms are finite, symbolic, and historically shaped.

To think with this awareness is to accept that we do not stand outside the cosmos, judging it from nowhere. We think *within* it, with instruments, languages, and concepts that are themselves cosmic events. A critique of cosmological reason thus aims at the most modest and the most ambitious of goals: to ensure that, as the universe grows in our equations and images, the clarity with which we understand our own act of knowing grows with it.

## Book I

# Approaching the Portal to Cosmological Hermeneutics

Alice paused before the mirror,  
which showed no face yet seemed to know.

*"What lies beyond a boundary?"* she asked.

*"A question,"* said the glass, *"from which all paths must go."*

*Alice in the World of Cosmological Reason*

# Chapter 1

## The Historical Life of the Transcendental: From Cosmic Order to Cosmological Hermeneutics

### **Prelude — Why the Transcendental Has a History**

Every philosophical system begins by assuming something about what must be presupposed. Most traditions take these presuppositions to be timeless. Yet the most profound insight of the modern era is the recognition that even the conditions of knowledge have a history. Nothing remains untouched: not space, not time, not the observer, not even the categories through which the world becomes intelligible.

To say that the transcendental has a history is not to relativize it. It is to recognize that the very *function* of the transcendental—determining what must be in place for knowledge to occur—changes as the object of knowledge changes and as the knowing subject changes. A cosmos that is hierarchical, closed, and finite does not demand the same conditions of understanding as a cosmos that expands, curves, decoheres, entangles, or multiplies itself across inflationary domains.

In this sense, the *Critique of Cosmological Reason* requires a preliminary chapter that Kant himself never wrote: a genealogy of the very *form* of the *a priori*. It is an account of how the conditions of intelligibility were understood before Kant, how Kant transformed

them, and why the developments of contemporary cosmology compel a further transformation.

The goal of this text is simple: to reveal that what Kant called the transcendental is not a uniquely eighteenth-century discovery but a long arc of philosophical evolution—one that begins in ancient cosmology, crystallizes in the Critical philosophy, and emerges today as a hermeneutic-cosmological framework capable of accompanying a universe that itself evolves.

## **Part I — Before Kant**

### **1. The Ancient Cosmological A Priori**

Long before philosophy asked about the conditions of knowledge, it asked about the order of the cosmos. For the Greeks, intelligibility did not arise from the mind but from the world itself. The cosmos was seen as a structured totality, a *kosmos* in the literal sense: an ordered arrangement.

Pythagorean thought turned number into a metaphysical foundation, suggesting that reality itself obeyed a hidden mathematical harmony. Heraclitus located order in the *logos*, an ever-present rational structure permeating change. The Stoics developed the idea of *sympatheia*—a universal interconnectedness binding all parts of the world. Even Aristotle, often read as the father of empirical realism, grounded knowledge in the ontological architecture of substance, form, and causation.

What unites these approaches is a deep conviction: *the cosmos itself supplies the a priori*. The structure of reality precedes and shapes the structure of the mind. Intelligibility is cosmological before it is epistemological.

This is the first life of the transcendental: *as the world's intrinsic order*.

## 2. The Medieval Theological A Priori

In the medieval period, the a priori became theological. For Augustine, knowledge required divine illumination; the structure of human cognition reflected the structure of the divine intellect. For Aquinas, the *ordo essendi*—the order of being—was mirrored in the *ordo cognoscendi*—the order of knowing. Whether through emanation, participation, or analogy, medieval thought retained the conviction that the conditions of intelligibility lay in the architecture of reality, not in the subject.

This second life of the transcendental is grounded in a *metaphysics of creation*. The conditions of knowledge are inscribed in the world by God and perceived by the mind through an act of cognitive alignment. The cosmos remains stable, hierarchical, and finite; the human intellect participates in this order without altering it.

## 3. Crisis and Transition

The scientific revolution shattered this worldview. The Copernican dethronement of Earth, the Galilean mathematization of motion, and Newton's law of universal gravitation produced a universe governed by invariant laws that did not depend on theological architecture.

But this shift created a new problem: if the structure of knowledge no longer derives from the structure of the world, then where does it come from?

By the late seventeenth century, empiricists grounded knowledge in *sensation* alone, while rationalists appealed to *innate* ideas. Both approaches failed to explain why mathematics applies to nature or

how universal laws can arise from contingent experience. The stage was set for Kant.

## Part II — Kant

### 4. The Transcendental Turn

Kant's answer was revolutionary. The conditions of knowledge do not lie in the cosmos (as the ancients believed) nor in divine illumination (as the medievals believed) but in the *intellectual constitution of the subject*. Space and time are forms of intuition; the categories are functions of synthesis; the unity of experience derives from the unity of apperception.

In introducing the transcendental, Kant reversed the ancient relation between mind and world. Instead of a mind conforming to the cosmos, the cosmos of experience conforms to the mind's a priori forms.

This is the third life of the transcendental: *as the structure of cognition*. Yet this shift—from cosmos to subject—was only the third movement in a longer history. As our understanding of the universe changes, the very locus of the transcendental must shift once again.

### 5. Kant's Cosmology and Its Limitations

Kant developed his system within a Newtonian universe: space and time absolute; gravity instantaneous; the cosmos static and eternal; the observer external to the phenomenon.

If Kant displaced the cosmos from the center of knowledge, modern physics shows that the subject cannot remain there either. A universe that evolves, curves, and generates observers within itself demands a transcendental that is no longer solely subjective, but cosmological in