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Part I: PHILOSOPHY OF THE COSMOS

Fundamental Rights: Discursive Thinking Through of Unconcealed

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*This article contributes to the discussion on the nature of rights, law, and justice. Rights are defined by the Greco-Latin concept of *thémis/fas*, while law and justice are characterized by *dikē/ius*, with both being explored through physics, ethics, and logic. The main idea of the article is to differentiate between “history,” *historia*, and dialectics as upward approaches into the past that explain the wandering of modern society and shed light on Socrates’ question, “...but in which manner is it necessary to live?” The author suggests a unified language and core linguistic concepts to describe the physical logic of reality, which *thémis/fas* and *dikē/ius* reveal as derivative (emergent) properties, or the history of the universe, encompassing planetary and human evolution.*

*Keywords: order, right, law, unconcealed, *thémis*, *dikē*, Plato, universe*

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“For it is no ordinary matter that we are discussing,
but in which way/manner (*trópos*) is it necessary to live?”¹

Introduction

Russian aggression against Ukraine (2014-2025) and Putin’s nuclear threats² and subsequent escalation in the Middle East³ make us think about the foundations of our world society. On the one hand, the Universal Declaration of Human Rights,⁴ the Global Governance and Global Institutions must guarantee “the right of peoples and nations to secure and sustain their development on the basis of international law.”⁵ On the other hand, we are witnessing the clash between democratic and authoritarian models of international order. Herewith, there is the need to refine and revise the concepts of “order,” “right” and “law” as the world-whole and whole-part relationships.

“What are *thémis/fas* and *dikē/ius*?”⁶ is the central question of the proposed study. I investigate unconcealed, more specifically, the equal to *alēthēs*,⁷ literally “what can’t be hidden,”⁸ which determines the Fundamental (natural) Rights and the nature of law and justice (jurisprudence). First and foremost is the *phúsis*⁹ that forms “Order” and its

¹ οὐ γὰρ περὶ τοῦ ἐπιτυχόντος ὁ λόγος, ἀλλὰ περὶ τοῦ ὄντινα τρόπον χρὴ ζῆν (*Republic* 1.352d4-5). See (Torri, 2017: 32). The Greek text is cited according to Burnet, 1901; 1903; 1978; 1907; Duke et al., 1995. The author follows the translation (unless otherwise indicated) of *Plato’s in twelve volumes*, 1967-1979. The passages quoted demonstrate Plato’s views and/or argue for transliteration.

² Rachman, Gideon. Putin’s nuclear threats cannot be ignored. *Financial Times*, September 26, 2022. <https://www.ft.com/content/25862f8d-d6de-48c7-a892-091e5f909734>.

³ Dunne, Charles. Opinion: How likely is a US-Iran escalation in the Middle East? October 27, 2023. <https://edition.cnn.com/2023/10/26/opinions/israel-hamas-iran-us-middle-east-dunne/index.html>

⁴ “The Universal Declaration of Human Rights (UDHR) is a milestone document in the history of human rights. Drafted by representatives with different legal and cultural backgrounds from all regions of the world, the Declaration was proclaimed by the United Nations General Assembly in Paris on December 10 1948 (General Assembly resolution 217 A) as a common standard of achievements for all peoples and all nations). <https://www.un.org/en/about-us/universal-declaration-of-human-rights>

⁵ “Universal Declaration of Human Rights.” <https://www.un.org/sites/un2.un.org/files/2021/03/udhr.pdf>

⁶ I selectively use Plato’s semantics and vocabulary. In most cases, these are primary words in Transliteration A according to the *Liddell, Scott, Jones Ancient Greek Lexicon* (LSJ). They are shown in italics. Greek words are used as technical terms, so I do not stick to grammatical cases except for direct quotations. For me, the original meanings of words, indicated in footnotes and partially in the Glossary, are essential. I primarily use Plato’s dialogues, the Platonic corpus, the *Liddell, Scott, Jones Ancient Greek Lexicon* (LSJ) and *Thayer’s Greek-English Lexicon of the New Testament* (Thayer, 1995). Many Greek words have several significant connotations. In this case, I single out the most important ones for my research and separate them with a forward slash (“/”). The reader does not need to know Ancient Greek. Plato’s vocabulary helps me restore discussions’ primary meanings and use them as an authoritative beginning for my study.

⁷ *Alēthēs* (ἀληθής, adjective) unconcealed, true; opposite *lēthē*.

⁸ *Alēthēs*, “stresses undeniable reality when something is fully tested, i.e. it will ultimately be shown to be *fact* (authentic)” (Thayer, 1995).

⁹ *Phúsis* (φύσις, noun), origin; the natural form or constitution of a person or thing as the result of growth; the regular order of nature (Liddell & Scott, 1940). I follow Gregory Vlastos (2005: 4-19) and Werner Jaeger (1961), which indicate the difference between the meanings of *phúsis* and naturalism. The *phúsis* and its derivatives are described by the terminology and meanings of quantum mechanics.

derivatives “physical reality,” “physical systems,” etc. Where the concept of “Order” should be understood in Émile Benveniste’s sense, “We have here one of the cardinal notions of the legal world of the Indo-European, to say nothing of their religious and moral ideas: this is the concept of “Order,” which governs also the orderliness of the universe, the movement of the stars, the regularity of the seasons and the years; further, the relations of gods and men; and finally, the relations of men to one another.”¹⁰

The Boundaries of the Human (human rights and duties) and fundamental freedoms¹¹ are the second researched problem.¹² I consider the work of *thémis/fas* and *díkē/ius* using the example of the *ánthrōpos/homō* and discursively think through Plato’s question in the epigraph of the book, “...but in which way/manner (*trópos*) is it necessary to live?”¹³

Platone philosophandi ratio triplex are used to discursively think through the equal to *alēthēs*, unconcealed, “true, as it accords with *fact (reality)*, i.e. *attested* because *tested*,”¹⁴ that determine the meanings of “Freedom, Equality, and Justice for All,” human evolution, and basic “Rights of Man and the Citizen.”¹⁵ Where *Platone philosophandi ratio triplex* are “...a threefold scheme of philosophy inherited from Plato: one division dealt with conduct and morals, the second with the secrets of nature, the third with dialectic and with judgement of truth and falsehood, correctness and incorrectness, consistency and inconsistency, in rhetorical discourse.”¹⁶ As a consequence, unconcealed in “Order” and the Fundamental Rights of equal to *alēthēs* are discursively thought through ethics, physics, and logic.

I understand and implement *dialégesthai*¹⁷ and *dialégomai*,¹⁸ “to practice dialectics,” or “discursively think through” as an opportunity to use the help of the best scholarches¹⁹ and “go through” (*dierkhomai*)²⁰ the present into the past, to the ultimate beginning, to show forth/

¹⁰ (Benveniste, 1973: 546).

¹¹ The book does not explore the Human Rights in the UNICEF sense (UNICEF Finland, 2015).

¹² See (Bazaluk 2024).

¹³ (*Republic* 1.352d4-5).

¹⁴ (Thayer, 1995).

¹⁵ “Declaration of the Rights of Man and of the Citizen, French Declaration des Droits de l’Homme et du Citoyen, one of the basic human liberties charters, contains the principles that inspired the French Revolution. Its 17 articles, adopted between August 20 and August 26, 1789, by France’s National Assembly, served as the preamble to the Constitution of 1791. The basic principle of the Declaration was that all “men are born and remain free and equal in rights” (Article 1).” *Encyclopaedia Britannica*.

¹⁶ Fuit ergo iam accepta a Platone philosophandi ratio triplex, una de vita et moribus, altera de natura et rebus occultis, tertia de disserendo et quid verum quid falsum quid rectum in oratione pravumve quid consentiens quid repugnet iudicando. [p. 9] (Cicero, 1933: 1.19). Translated by H. Rackham (1933). See (Horky, 2020: 171-181).

¹⁷ “This is the word appropriated by Plato’s own medium to designate itself: ‘to engage in [Socratic] dialogue’ or ‘to practice dialectic’” (Nagy, 2002: 32).

¹⁸ *Dialégesthai* (διαλέγεσθαι, verb) and *Dialégomai* (διᾱλέγομαι, verb), “to practice *dialektikē*,” “to reveal results in discussion,” or “to think discursively.” Gregory Nagy states, “*dialégesthai* is key to the survival of Socrates’ language and of his message” (Nagy, 2002: 32).

¹⁹ “The best” is my subjective assessment of everyone accompanying my ascent in the endnotes. The so-called “endnotes” are the actual stages of my upward path. The triumphant ascent is solely the merit of my guides. If, in reality, the ascent turns out to be stereotypical wandering, then it is all my fault.

²⁰ *Dierkhomai* (διέρχομαι, verb, from *diā-*, through, thoroughly + *ērchoμαι*, *érkhomai*, to come, go), to go through, pass through (Schur, 2015; Gonzalez, 2009: 207-208; McPherran, 2007: 92).

manifest (*emphanízō*²¹) by *lógos*²² seen and *make* the upward way/road (*hodós*²³) recognizable and completely functional. “In the *diálogos* led by Socrates, the verb *diérkhomai* ‘to go through’ is regularly used to designate discussion, conceptualizing *diálogos* as traveling.”²⁴ I discern three upward ways/roads (*hodós*) into the past: a history, *historía* and *dialektikē*, to follow the latter. Where history is “(i) all the events that happened in the past, (ii) the past events connected with the development of a particular place, subject, etc., and (iii) (also History) the study of past events, especially as a subject at school or university”;²⁵ *historía* is an inquiry of a particular guiding perspective;²⁶ and *dialektikē* (dialectic) is the ability “to go through” (*dierkhomai*) guiding perspectives, “asking itself questions and answering, affirming and denying.”²⁷

Diá-lógos, proposed by Plato, leads the way (*hēgéomai*²⁸) for my ascent to unconcealed. The preposition *διά-* (*diá-*) “across (to the other side), back-and-forth to go all the way through”²⁹ indicates the necessary work of the *lógos* itself. The latter is understood by me not statically, as “that which is said: word, sentence, speech,” but dynamically, as “that which is thought: reason, consideration, computation.”³⁰ That is why the way to follow (*méthodos*)³¹ is a metaphorical and literal use of Plato’s *lógos*.³² On the one hand, the proposed article sings the *hýmnos*³³ of Plato’s *philosophía* and the dialectical way to follow (*méthodos*). The dialectic method helps me to cleanse/purify (*kathairō*)³⁴ the concrete upward way/road (*hodós*) into the past to formalize the *thémis/fas* and *dikē/ius* concepts and, therefore, equal to *alēthēs*, which determines what we call “the nature of rights” and “the nature of law and justice (jurisprudence).” On the other hand, Plato’s *lógos* is used as *terminus technicus* and is

²¹ *Emphanízō* (ἐμφανίζω, (From ἐν, *in* (inside, within) + φαίνω) verb), show forth, manifest, to become visible (Liddell & Scott, 1940).

²² ζητοῦντι καὶ ἐμφανίζοντι λόγῳ τί ποτ’ ἔστι (*Sophist* 218b9-c1).

²³ *Hodós* (ὁδός, noun), a way, road.

²⁴ (Schur, 2015) with modification.

²⁵ <https://www.oxfordlearnersdictionaries.com/definition/english/history?q=history>; <https://dictionary.cambridge.org/dictionary/english-spanish/history>

²⁶ *Historía* (ἱστορία, noun) inquiry, systematic observation or scientific observation (Liddell & Scott, 1940).

²⁷ (*Theaetetus* 189e-190a). Translated by Harold N. Fowler. *Dialektikē* (διᾱλεκτική, noun), dialectic.

²⁸ *Hēgéomai* (ἡγέομαι, verb) lead the way, command and the figurative sense “believe, judge, estimate” (Benveniste, 1973: 164-167).

²⁹ (Thayer, 1995).

³⁰ (Liddell & Scott, 1940). “λόγος is not simply a means of expression that can be dispensed with: it is a fundamental characteristic of human existence; because humans are the ζῶον λόγον ἔχον, the world is necessarily disclosed to them through λόγος” (Gonzalez, 2009: 23).

³¹ *Méthodos* (μέθοδος, noun), path (hodos) of pursuit (meta-), to pursue one’s inquiry, or literally “the way to follow.”

³² Andrea Capra (2015) delightfully reveals this feature of Plato’s vocabulary. I will limit myself to one example. The noun *kósmos* (κόσμος) means an “ordered system,” and metaphorically it is an ornament. The derivative verb *kosméō* (κοσμέω) is literally “to put in order,” and metaphorically, it is to ornament. Both meanings are not used as either/or but often complement and enrich each other.

³³ ὕμνος, “*hymnos* is not just a “hymn” – that is, a song sung in praise of gods or heroes – but also a song that functions as a connector, a continuator” (Nagy, 2002: 70).

³⁴ καθαίρασθαι ἀνάγκη (*Phaedrus* 243a2-3), literally a force/constraint/necessity (*anankē*) cleanse/purify (*kathairō*) myself.

“an authoritative beginning that makes continuity possible.”³⁵ It accompanies my ascent into the past to rethink the Pythagorean Symbol “Don’t step over the yoke” or “Don’t step over equal/equivalent (*isos*³⁶) and right/righteous (*dikaios*³⁷)” in the interpretation of Diogenes Laertius.³⁸

I have used and propose to further use Plato’s *lógos* as a unified language and an abstract tool, a formalism for the “pictorial” and “symbolic” representation³⁹ of *themis/fas* and *dikē/ius*, and the “Order” they show/say authoritatively. I follow Niels Bohr’s experience and propose a unified language to describe the physical logic of reality or, otherwise, the unconcealed “Order.” Plato’s *lógos* here are the fundamental linguistic concepts that help discursively think through modern developments in quantum physics, molecular physics, and neuroscience to formulate propositional formulas. That is why I ascend into the past, but only to clarify the present, namely, *thémis/fas* and *dikē/ius* as the two “facts of showing” the origin, evolution, and nature of the universe, including planetary evolution and the actual *historía* of the *ánthrōpos/homō*.

The original meanings of the Greek words that are used as fundamental linguistic concepts are taken mainly from Liddell and Scott’s Greek-English lexicon and Thayer’s Greek-English Lexicon of the New Testament, so the reader does not need to know Greek. The only important thing is that the fundamental linguistic concepts “say” according to their nature, i.e. as *superstitiosus*. I have been unlocking “the gift of second sight” in them, “This is how *superstitiosus* denotes the gift of second sight, which is attributed to “seers,” that of being a “witness” of events at which he has not been present.”⁴⁰

Plato’s *lógos* leads the way (*hēgeomai*) “to live by what has been said.”⁴¹ But more than that, it obliges to care for/attend to (*epimeléomai*⁴²) “a universal morality overriding tradition

³⁵ (Nagy, 2002: 70).

³⁶ *Ísos* (ἴσος, adjective, probably from οἶδα), equal, “equality; having the same (similar) level or value; equivalent, equal in substance or quality”; “(*isos*) is the root of the English terms, “*isometric*” and “*isosceles*” – referring to *equivalencies*” (Thayer, 1995); “repeated to denote equal relations; equal in rights” (Liddell & Scott, 1940; *Laws* 6.774c4).

³⁷ *Dikaíos* (δίκαιος, adjective, derived from *dikē*), right, righteous.

³⁸ τὸ δὲ ζυγὸν μὴ ὑπερβαίνειν, τούτεστι τὸ ἴσον καὶ δίκαιον μὴ ὑπερβαίνειν (Diogenes Laertius, 8.1.18).

³⁹ “A pictorial representation is a formalism that has an isomorphic relation to the objects it represents such that the visualized structure of the representation corresponds to a similar structure in nature. Conversely, a symbolic representation does not stand for anything visualizable. It is an abstract tool whose function it is to calculate a result whenever this representation is applied to an experimental situation” (Faye, 2019).

⁴⁰ (Benveniste, 1973: 771).

⁴¹ ““The tracks” Plato bids his readers to follow include the entire dialogue, hence the full course of its argument and its complementary warnings against misology and dogmatism, which encourage critical consideration of conclusions and premises alike. To follow these tracks is to adopt as one’s own the spirit and method of Socratic inquiry and to emulate his life and character: “to live by what has been said” (White, 2000: 162).

⁴² *Epimeléomai* (ἐπιμελέομαι, verb, from ἐπί, fitting on, which intensifies μέλει, care for, take an interest in), to care for (physically or otherwise), attend to.

and group interests.”⁴³ The mission of the article is (i) to show forth/manifest (*emphanízō*) by *lógos* the *thémis/fas* and *dikē/ius*, which show/say unconcealed as the legal “Order,” (ii) to exist/be (*eimí*) always and not destroyed.⁴⁴

Chapter One

The “Order” Leads the Way/Judges (*Hēgéomai*)

Chapter One brings to light (*phainō*) the fundamental “meaningful unit,” the One, which the proposition “Order leads the way/judges (*hēgéomai*)” both asserts and separates/defines (*horizō*). The *thémis/fas* shows/says authoritatively the One as the logic of reality, in which equal to *alēthēs* is the freedom to express itself in the “habitual” manner of (*dikēn*) the (3a) “X exists/is (*eimí*).” The *thémis/fas* or the First Fundamental Right shows/says the only rightful (*themitós*) for the proposition “Order leads the way/judges (*hēgéomai*)” and its meanings. Namely, equal to *alēthēs* is *kathairō* that has the right (protected liberty) to come to be (*gígnomai*) both the world-whole (the *katharós* measure) and whole-part relationships (*méthodos* “*kathairō*” and “never is (*ón*)”) to exist/be (*eimí*) complete on its own as far as possible. The *dikē/ius*, in turn, shows/says equal to *alēthēs* for the “habitual” manner of (*dikēn*) a particular *kathairō*. The proposition “X *hēgéomai/duco*” asserts and separates/defines (*horizō*) unconcealed as the right and duty to ever have/hold (*échō*) the maximum possible *anánkē* together with equal/equivalent (*isos*), but at the same time, to care for/attend to (*epimeléomai*) right/just (*dikaíos/iustus*) as “the measure of all things” in the highest degree. The *dikē/ius* formula describes the “habitual” manner of (*dikēn*) a particular *kathairō*, both unchanging and changing properties.

1.1 What is *alētheia*?

§ 1. “The Order leads the way/judges (*hēgéomai*)” is the main proposition of our study. The proposition asserts the fundamental “meaningful unit,” the One, which determines the subsequent logical elements in the judgement. Moreover, our understanding of the Context Principle⁴⁵ is based on *Platone philosophandi ratio triplex* and, above all, “What is it?”⁴⁶ On the one hand, according to Aristotle, “What is it?” was Socrates’ most significant philosophical innovation;⁴⁷ on the other hand, it is the basis of the dialectic method (*dialektikí tekhnē*) “as a means of arguing for or against any philosophical position by debating on both

⁴³ “Through the cultic prescriptions emanating from Delphi,” Walter Burkert tells us (Burkert, 1985: 148), “the outlines of a universal morality overriding tradition and group interests may be discerned for the first time among the Greeks.” The inscriptions on the temple walls convey the spirit of this morality: “Know thyself;” “Nothing in excess;” “Observe the limit;” “Bow before the divine;” “Fear authority;” “Glory not in strength” (Reeve, 2000: 29).

⁴⁴ τί τὸ ὄν ἀεί opposes ὄν δὲ οὐδέποτε (*Timaeus* 27d4-28a1); “is always (*ón*)” opposes “not ever is (*ón*)” (Ademollo, 2018: 63).

⁴⁵ In several places in the *Tractatus*, Wittgenstein quotes the Context Principle almost verbatim from Frege’s *Foundations of Arithmetic*. For example, “Only propositions have sense: only in the nexus of a proposition does a name have a meaning” or “An expression has meaning only in a proposition” (*Tractatus* 3.3, 3.314). Wittgenstein is here making much the same use of the Context Principle as Frege: acknowledging the fundamental role of the sentence (proposition) within language – that it is only with a sentence that one can say anything and also that the reference of the parts is a matter of their contribution to the truth of whole propositions (Lucas, 2015: 31).

⁴⁶ τί ποτ’ ἔστι.

⁴⁷ (*Metaphysics* 1078b22ff; Charles, 2010: 1)

sides of any putative or actually held alternative.”⁴⁸ As a result, *the proposition* “Order leads the way/judges (*hēgēomai*)” both asserts and separates/defines (*horizō*)⁴⁹ the One. “What is less often remarked upon is the significance that the Socratic search for a definition begins with a definition.”⁵⁰

Philosophy is first and foremost “discussion and argument devoted to the search for definitions” and “the journey to view (...) the notion of that which a definition defines (...) by the dialectical method of discussion,” *dialektikē*.⁵¹ Philosophy generates the proposition and consequently, the results that it expresses. This means that, at first glance, the proposition “Order leads the way/judges (*hēgēomai*)” asserts the One as “truth.” “The business of any writer, and especially of the philosopher, is, as they say to discover, utter, and diffuse truth and adequate conceptions.”⁵² At the same time, the “What is it?” question, grounding the proposition context, excludes completeness and unambiguousness in the answers. “Dialectical *lógos* does not at all have the structure of definitely affirming one thing rather than another.”⁵³ The One within frozen boundaries, like dogma or fact, or even pure logic, becomes impossible. Moreover, the One cannot and never shows itself as “truth,” i.e. “(i) the quality of being true, (ii) a fact or principle that is thought to be true by most people.”⁵⁴ The proposition “Order leads the way/judges (*hēgēomai*)” expresses the One always and only as the *aletheia*, “unconcealment, non-oblivion; opposite *lēthē*.”⁵⁵

Literally, it means the following. The “What is it?” question rules in the proposition and, therefore, the proposition expresses a guiding perspective, not an answer. Furthermore, this is a perspective into the past, within the *arkhē*,⁵⁶ not the future. That is why the One is

⁴⁸ “Two of the most important such traits that, though not unconnected between them, acquired different degrees of pre-eminence in various historical circumstances, and can be regarded as of paramount importance throughout its (*philosophy*) history are: a) a pronounced emphasis on the dialectic method (*dialektiki tekhnē*) as a means of arguing for or against any philosophical position by debating on both sides of any putative or actually held alternative; and b) the fundamental downgrading of, if not complete distrust for, perceptual cognition” (Kalligas, 2020: 6).

⁴⁹ *Horizō* (ὀρίζω, verb, from ὅρος (*hóros*, “boundary, border”) + ἵζω (*-ízō*)), divide or separate from, as a border or boundary, define a thing (Liddell & Scott, 1940).

⁵⁰ (Burnyeat, 2012: 65).

⁵¹ “The word ‘philosophy’ here means what Socrates usually means by it: discussion and argument devoted to the search for definitions. No other interpretation is possible, given that the journey is a journey to view the Forms. For the notion of a Form is first and foremost the notion of that which a definition defines. So the myth really does tell Socrates about himself. He uses the idea of recollection, as he does in the *Meno* and *Phaedo*, to illuminate his own method of philosophising. That is what is common to the three dialogues in which recollection is discussed. They are all reflecting on the pre-suppositions of or conditions for successful philosophical inquiry by the dialectical method of discussion” (Burnyeat, 2012: 248).

⁵² (Hegel, 2001: 11).

⁵³ “Thus, unlike the *lógos* that characterizes *δόξα*, this dialectical *lógos* does not at all have the structure of definitely affirming one thing rather than another, that is, it does not have the structure of affirmation, but rather the structure of “divided counsel,” of the back-and-forth of question and answer. Thinking is not belief and belief is not thinking” (Gonzalez, 2009: 208).

⁵⁴ <https://dictionary.cambridge.org/dictionary/english/truth?q=Truth+>

⁵⁵ *Alētheia* (ἀλήθεια, noun, from *alēthēs*).

⁵⁶ *Arkhē* (ἀρχή, noun) beginning, origin.

alētheia and, specifically, the guiding perspective that always has/holds (échō)⁵⁷ the *arkhē* and pursues/practices (*epitēdeúō*)⁵⁸ the present.

Let us pay attention to the essential connotation of the noun *arkhē*, which is transmitted to it from the verb *árkhō*. It is a beginning/origin, which leads, rules, governs and commands.⁵⁹ It follows that *alētheia* – unconcealment – is always and only a guiding perspective that “leads, rules, governs, commands” from the past. It is a wellspring that obliges to care for/attend to (*epimeléomai*) itself.

Biblically, the proposition “Order leads the way/judges (*hēgéomai*)” asserts and separates/defines (*horizō*) “the way/road (*hodós*), the *alētheia* and the living (*zōē*).”⁶⁰ However, if we go further to Plato, *alētheia* is put first: “Of all the *agathón*, for gods and men alike, *alētheia* stands first.”⁶¹

I would like to make a few clarifications before ascending to *alētheia*, i.e. to the guiding perspective that “leads, rules, governs, commands” from the past, which we observe as unconcealed and past events. Actually, the meaning of a proposition was prior to the choice and meaning of its component words. The subject “Order” and the predicate “*hēgéomai*” were selected according to the meaning of the proposition and the guiding perspective it forms. When choosing a subject, I have considered the concepts of “*phúsis*,” “cosmos,” and “nature.” However, Werner Jaeger showed the contradictory meanings of the “nature” concept,⁶² while Gregory Vlastos proved the priority of the “*phúsis*” concept over the “cosmos” one.⁶³ Thus, the “*phúsis*” concept was the most appropriate for the context of the proposition, and it will be used in the book, yet in more limited, modern senses.⁶⁴

The argument of Émile Benveniste,⁶⁵ on the one hand, and the desire to combine the “fertile” dialectical *lógos*⁶⁶ and our current understanding of the world, on the other hand,

⁵⁷ Échō (ἐχῶ, verb), to have, hold.

⁵⁸ Epitēdeúō (ἐπιτηδεύω, verb), pursue or practise a thing, make it one’s business (Liddell & Scott, 1940).

⁵⁹ ἄρχω (*árkhō*, “to begin”) + -η (-ē, verbal noun suffix) (Liddell & Scott, 1940). See especially (*Statesman* 260e8-9; 275a3-6; 304b11-304c1) and discussion (Gill, 2010: 186).

⁶⁰ ἡ οδὸς καὶ ἡ ἀληθεῖα καὶ ἡ ζῶη (John 14:6). Ζῶή (ζωή, noun, from *záō*), “living, i.e. one’s substance, property” (Liddell & Scott, 1940).

⁶¹ ἀλήθεια δὴ πάντων μὲν ἀγαθὼν θεοῖς ἡγεῖται, πάντων δὲ ἀνθρώποις (*Laws* 5.730c1-2). Translated by R.G. Bury.

⁶² “Christian interpreters (and not only they!) ought to remember that this Greek concept of nature is not identical with naturalism in our modern sense, but almost the opposite of it” (Jaeger, 1961: 18). That is why I am avoiding the use of terms “nature” and “natural.”

⁶³ “That *physis* is even more basic than *kosmos* is evident from the fact that the discoverers of the cosmos came to be called *physiologoi*, not *kosmologoi*, and that “nature” occurs much more frequently in titles of their treatises than does “cosmos” (Vlastos, 2005: 18).

⁶⁴ The concept of *phúsis* will express the modern meanings of general relativity and quantum physics.

⁶⁵ (Benveniste, 1973: 546-548).

⁶⁶ “Plato is fond of exploring the lonely feeling of helplessness on the part of any author who worries about the future life of his written words, which cannot defend themselves if they come under attack (*Phaedrus* 275e, 276c8). One way out is to use the *tekhne* ‘art’ that Socrates calls dialectic, *dialektikē* (276e5). The user of this art can plant words into a receptive *psukhē* (e6), and these words will be fertile (277a1) and not sterile (akarpoi: a1) like the words planted on a writing surface (276c8). Unlike those written words, these dialectical words can defend not only themselves but also the one who planted them (276e8–277a1), and they can even reproduce themselves into eternity (277a2–3)” (Nagy, 2002: 32).

convinced me to opt for the concept of “order,” not “*phúsis*.” The main advantage of the “order” concept is (i) its “extreme importance” for common Indo-European language,⁶⁷ (ii) its “fertility” in other languages,⁶⁸ and (iii) direct connection with the topic of our research. Following Benveniste, I will write the “Order” with a capital letter.

Émile Benveniste also played an important role in choosing the predicate for the proposition. On the one hand, “the Latin *duco* and Greek *hēgéomai* have the same senses; the literal sense “lead, command” and the figurative sense “believe, judge, estimate.”⁶⁹ On the other hand, the meaning of a proposition was decisive when choosing the “*hēgéomai*” concept. I needed the predicate to express the work of *thēmis/fas* and *dikē/ius*. The “*hēgéomai*” concept fully corresponds to this. In our study, the “*hēgéomai*” expresses the changing “Order,” including that demonstrated in various cosmological models of the Big Bang based on Metric expansion⁷⁰ and compatible with the Hubble–Lemaître law.⁷¹ Furthermore, the linguistic significance of “*hēgéomai*” is not inferior to the linguistic significance of the chosen subject. Greek *hēgéomai* is derived from Proto-Hellenic **ágō* (“I lead, lead away, bring”),⁷² from Proto-Indo-European **h₂égeti* (“to be driving”), Sanskrit *ájati* (“he drives”).

Thus, the subject “Order” and the predicate *hēgéomai*, taken individually and in isolation, are complete on their own. They demonstrate extreme importance and fertility in world history, not just in Western European history.⁷³ However, more important is that the richness of their meanings helps the researcher to “go through” (*dierkhomai*)⁷⁴ modern philosophy and physics into the past and bind on/lay hold (*epháptō*)⁷⁵ research at the

⁶⁷ “It is represented by Vedic *ṛta*, Iranian *arta* (Avestan *aša*, by a special phonetic development” (Benveniste, 1973: 546).

⁶⁸ “The importance of this notion is shown by the considerable number of lexical forms drawn from it. It would be pointless to enumerate in full all the Indic and Iranian derivatives of *ṛta* and *arta*, both in the vocabulary and proper names. That the term belongs to an ancient stratum of Indo-Iranian is shown by certain archaisms of morphology: the one “who is faithful to *arta*, who is morally accomplished” is called in Sanskrit *ṛta-van*, feminine *ṛta-varī*; similarly we have in Iranian *artavan*, *artavarī*. This remarkable difference between the masculine and the feminine of the suffixal form *-van*, *-varī* is explained by the ancient mode of declension, which is called “heteroclitic,” which has left traces in the declension of Greek *húdōr*, *húdotos* and Latin *iter*, *itineris*” (Benveniste, 1973: 547).

⁶⁹ (Benveniste, 1973: 164).

⁷⁰ “The metric expansion of space is a key part of science’s current understanding of the universe, whereby spacetime itself is described by a metric which changes over time in such a way that the spatial dimensions appear to grow or stretch as the universe gets older.” <https://www.cs.mcgill.ca/> The Friedmann–Lemaître–Robertson–Walker metric (the FLRW metric) is the basis of Big Bang cosmology.

⁷¹ It is the observation in physical cosmology that galaxies are moving away from Earth at speeds proportional to their distance.

⁷² (Thayer, 1995).

⁷³ I take into account the fallacy “for this current West-European scheme of history, in which the great Cultures are made to follow orbits round us as the presumed center of all world-happening” and strongly condemn and reject “privileged position to the Classical or the Western Culture as against the Cultures of India, Babylon, China, Egypt, the Arabs, Mexico” (Spengler, 1944: 18).

⁷⁴ “In its literal and etymological senses, *prattō* ‘to do, fare’ is an impeccable synonym for *dierkhomai*, inviting a comparison between paths of discourse and of method. And *prattō* is aptly translated by the English word *fare* because both words, like *dierkhomai*, are anchored in the semantic idea of ‘passing through’” (Schur, 2015).

⁷⁵ *Epháptō* (ἐφάπτω, verb, ἐφ (on, upon) + ἄπτω), bind on, lay hold of, attain to (Liddell & Scott, 1940).

Academy⁷⁶ and in earlier historical times. The concepts of “Order” and *hēgēomai* fasten/bind to (*háptō*⁷⁷) “seers,” that of being a “witness” of events at which he has not been present.”⁷⁸ They themselves wield “the power of superstition” and show forth/manifest (*emphanízō*) the past like a “seer who speaks of past events as if he had actually been present.”⁷⁹

The historical and semantic value of the “Order” and “*hēgēomai*” concepts is shown even more clearly in the complete subject-predicate structure. The value of the chosen subject and predicate is enriched by the context and, specifically, by the *Platone philosophandi ratio triplex*. I understand it as Plato’s heritage and the Academy, recorded by Cicero,⁸⁰ and use it to expand the context that forms the meaning of the proposition “Order leads the way/judges (*hēgēomai*).” As a result, the proposition “Order leads the way/judges (*hēgēomai*),” on the one hand, is based on Frege’s three principles. “P1: Always to separate sharply the psychological from the logical, the subjective from the objective; P2: Never to ask for the meaning of a word in isolation, but only in the context of a proposition; P3: Never to lose sight of the distinction between concept and object.”⁸¹ On the other hand, two problems raised by Plato in the *Meno* constrain and oblige Frege’s context principle. We follow Frege and “always keep before our eyes a complete proposition,”⁸² but simultaneously, we mean the (i) “what counts as a good definition?”⁸³ and (ii) “what is to be defined?”⁸⁴

In other words, the proposition “Order leads the way/judges (*hēgēomai*)” asserts the fundamental “meaningful unit” – the One – as the “What is *alētheia*?” *mēthodos*. Where *mēthodos* is an upward way/road (*hodós*) into the past, the *arkhē*.

⁷⁶ I mean the 300-year history of Plato’s Academy, including Aristotle and other academics (Philodemus’ History, 2020; Plato’s Academy, 2020). “We know that Plato taught for a long time in a pre-existing gymnasium (387–367) and then, on his return from the second trip to Sicily, bought a property nearby, and it was in this ‘small garden in the Academy’ (κηπίδιον ... τὸ ἐν Ἀκαδημείᾳ) that he founded his school. I argue that, from the very beginning, the choice of the site was not coincidental but instead reflects the roots of Plato and his followers within a specific cultural background of which the Academy served as the heart” (Marchiandi, 2020: 11).

⁷⁷ *Háptō* (ἅπτω, verb), fasten or bind to (Liddell & Scott, 1940).

⁷⁸ (Benveniste, 1973: 771).

⁷⁹ (Benveniste, 1973: 771).

⁸⁰ (Cicero, 1933: 1.19).

⁸¹ (Gottlob Frege, 1950). “Merging all three principles together, it could be said that we are interested only in ‘judgeable contents,’ they constitute our ‘meaningful units,’ and they could be further analyzed in terms of an object that falls under a concept” (Costreie, 2010: 290)

⁸² (Gottlob Frege, 1950: §60).

⁸³ “His idea is a powerful one, which imposes a basic constraint on what is to count as a good definition. In his view, an adequate definition cannot merely point to features which are present only in some cases of virtue (*aretē*) or simply indicate features (one or more) which all and only virtuous things possess. Rather, what is sought must be in some way fundamental, the one feature which makes them all cases of virtue (*aretē*), the primary source of their virtue (*aretē*). It is not enough to find a property which all and only instances of virtue (*aretē*) necessarily possess (such as, for example, being worthy of moral admiration) if this is not what makes them cases of virtue (*aretē*)” (Charles, 2010: 4).

⁸⁴ “In the *Meno*, when Socrates seeks an account which will answer his ‘What is F?’ question, his target is described in the following terms:

[A] it is that one thing in virtue (*aretē*) of which all cases of F are F (72c7ff.);

[B] it is graspable without specialized knowledge by intelligent interlocutors (75d2–7);

[C] it is such that if one does not know it, one cannot know any other feature of F (71b3–7);

[D] it is such that if one does know it, one will be able to distinguish on its basis any case of F from any case which is not F (72c8–d1)” (Charles, 2010: 5–6).

The proposition both asserts and separates/defines (*horízō*) equal to *alēthēs*. Where *alēthēs* is an unconcealed guiding perspective, “what cannot be hidden” within the *arkhē*. It is the ultimate beginning into which one can “go through” (*dierkhomai*) *lēthē* to gaze on (contemplate) (*theáomai*)⁸⁵ the context and compositionality of a spectacle,⁸⁶ which is called “*alētheia*, *katharós*⁸⁷ and *eilikrinēs*.”⁸⁸ It is the “undeniable reality” in the past; the top at which “the gift of second sight” is revealed and, as a result, “a person knows the past as if he or she had been present.”⁸⁹

§ 2. The meanings development of *alētheia* and, moreover, their rethinking in terms of *verum* (“reality/realness”), “truth,” and “true,” has hidden the ultimate beginning toward which Plato’s dialogues direct. On the top within *arkhē*, Plato showed forth/manifested (*emphanízō*) by *lógos*⁹⁰ the three fundamental messages that most of all bring to light (*phainō*)⁹¹ *alētheia*, *katharós* and *eilikrinēs*,⁹² i.e., the unconcealed “Order” itself.

The first message, *alētheia* and *lēthē*⁹³ have a single common origin,⁹⁴ i.e. a beginning in which the opposition between them is eliminated.⁹⁵ Plato called it “unconditioned *arkhē*.”⁹⁶ The fundamental feature of the “unconditioned *arkhē*” was that it caused “a certain long,

⁸⁵ *Theáomai* (θεάομαι, verb, from *tháomai*, “to gaze at a spectacle”), properly, gaze on (contemplate) as a spectator; to observe intently, especially to interpret something (grasp its significance); to see (concentrate on) to significantly impact (influence) the viewer (Thayer, 1995).

⁸⁶ See (Wittgenstein, 1922). All this Fregean problematic issues seems to have its echoes in *Tractatus*, where both contextuality and compositionality are to be found:

• Contextuality:

3.3. Only propositions have sense; only in the sense of a proposition does a name have meaning.

3.314. An expression has meaning only in a proposition. All variables can be constructed as propositional variables.

• Compositionality:

3.318. Like Frege and Russell I construe a proposition as a function of the expression contain in it.

4.026. The meanings of simple signs (words) must be explained to us if we are to understand them (Costreie, 2010: 300).

⁸⁷ *Katharós* (καθαρός, adjective, a primitive word, akin to Latin *castus* (spotless), English *chaste*), physically clean, free from admixture (Liddell & Scott, 1940; Thayer, 1995).

⁸⁸ *Eilikrinēs* (εἰλικρινής, adjective; from *heilē*, “*shining of the sun*” and */krystallizō*, “to judge”), *rightly* judged because seen in *full light* (Thayer, 1995); unmixed, without alloy, pure. See (*Philebus* 52d9).

⁸⁹ (Benveniste, 1973: 771).

⁹⁰ (*Sophist* 218b9-c1).

⁹¹ *Phainō* (φαίνω, verb), to bring to light, to cause to appear.

⁹² τί ποτε χρῆ φάναι πρὸς ἀλήθειαν εἶναι; τὸ καθαρὸν τε καὶ εἰλικρινὲς (*Philebus* 52d9).

⁹³ *Lēthē* (λήθη, noun, from verb *λανθάνω* (also *λήθω*), I am concealed (hidden)), concealment, oblivion, closedness; opposite *alētheia*.

⁹⁴ “Plato characterizes both ἀλήθεια and λήθη as *places* to which the human soul goes and from which it comes” (Gonzalez, 2009: 241).

⁹⁵ Both terms are linked by etymology and meaning (Liddell & Scott, 1940; Thayer, 1995).

⁹⁶ ἀρχὴν ἀνυπόθετον (*Republic* 6.510b6). The “unconditioned *arkhē*” is understood from Plato’s dialogues or (1) conceptually as the *agathou* idea (τοῦ ἀγαθοῦ ἰδέαν) (*Republic* 6.505a-6.509c; 6.510a-6.511d; 7.518a-7.518d; 7.532c-7.532c; 7.534c; 10.621c-d; *Timaieus* 29a), or (2) mathematically as one (one, εἷς) (*Republic* 7.524e-7.525a). “Some of the names for the principles – one, many, indefinite dyad – show that Plato frequently thought of the highest, immaterial world in numerical terms. This is no surprise because he treated the entire universe, not just its immaterial component, as a chain of numbers” (Kalvesmaki, 2013).

jagged and uphill way/road.”⁹⁷ The discernment of the upward way/road (*hodós*)⁹⁸ has brought to light (*phainō*) the “What is *alētheia*?” *mēthodos* as on “*alēthēs* and the divine and what is not a matter of opinion.”⁹⁹

Consequently, Plato pointed out that the “What is *alētheia*?” *mēthodos* may be defined and measured,¹⁰⁰ and the dialectical way to follow (*mēthodos*), “What is it?”, has the edge in this matter. “In Plato’s dialogues dialectic is rarely a pure “showing” but is rather inextricably tied to the question of what is to be done.”¹⁰¹ As a result, “What is *alētheia*?” is showing itself to be the guiding perspective that *dialektikē* continually seeks (*zēteō*),¹⁰² cleanses/purifies (*kathairō*)¹⁰³ in order to fasten/bind to (*háptō*) it.

Plato investigated the “unconditioned *arkhē*” and the upward way/road (*hodós*) by “composing myths”¹⁰⁴ and mathematics.¹⁰⁵ And, more importantly, we know that “the dialectical way to follow (*mēthodos*) is the only one that raises up to the *arkhē*.”¹⁰⁶ *Dialektikē* helps to discern (*theōréō*)¹⁰⁷ and come to know (*ginōskō*)¹⁰⁸ the “What is *alētheia*?” *mēthodos* as the “*alēthōs* heaven and the *alēthinon* light and thus *hōs alēthōs* the earth.”¹⁰⁹

⁹⁷ τινα ὁδὸν μακράν τε καὶ τραχεῖαν καὶ ἀνάντη (*Republic* 2.364d3). Translated by Paul Shorey with modification.

⁹⁸ ἄνω ὁδοῦ (*Republic* 10.621c4). Ascending in Plato’s dialogues, see (Carone, 2007: 221; Fierro, 2003; Gerson, 2007: 48-63; Gonzalez, 2009: 151-152, 244-245; McPherran, 2000: 105-106; McPherran, 2007: 92; Schur, 2015; Sheffield, 2007: 24; White, 2000: 160-161).

⁹⁹ τὸ ἀληθές καὶ τὸ θεῖον καὶ τὸ ἀδόξαστον θεωμένη (*Phaedo* 84a7-b1).

¹⁰⁰ I consider the Definition Problem from Plato to the present day (Charles, 2010; Brown, 2010; Gill, 2010) and the Measurement Problem in quantum mechanics to be perfectly compatible concepts.

¹⁰¹ (Gonzalez, 2009: 48).

¹⁰² Ζετέω (ζητέω, verb), to seek by inquiring, to investigate to reach a binding (terminal) resolution, “getting to the bottom of a matter” (Thayer, 1995).

¹⁰³ Kathairō (καθαίρω, verb, from *katharós*), to make physically clean and free from admixture, cleanse/purify (Liddell & Scott).

¹⁰⁴ ποιεῖν μύθους (*Phaedo* 61b3). These are (*Gorgias* 522d-527b; *Phaedo* 107c-114c; *Republic* 10.614a-621b; *Phaedrus* 245c-249d). See the review by Alexey Losev (Plato, Volume 1, 1990: 810-813).

¹⁰⁵ “Plato greatly advanced mathematics in general and geometry in particular because of his zeal for these studies.” Translated by Paul Kalligas and Voula Tsouna (Philodemus’ History, 2020: 283). According to Vlastos, “the most important point of disagreement between Plato and Aristotle” is that “Aristotle wants to provide an explanation of nature that is based on ordinary language, whereas Plato wants to leave such an explanation up to mathematics, which, in ever-changing sensible things, represents the traces of intelligible stability” (Vlastos, 2005: xviii). For mathematics in Plato’s dialogues, see (Kalvesmaki, 2013; Karasmanis, 2020; Fierro, 2003; Philodemus’ History, 2020: 282-283). Adverb from *alēthēs* (ἀληθής) + -ως (-ōs).

¹⁰⁶ ἡ διαλεκτικὴ μέθοδος μόνη ταύτη πορεύεται, τὰς ὑποθέσεις ἀναιροῦσα, ἐπ’ αὐτὴν τὴν ἀρχὴν (*Republic* 7.533c6-7).

¹⁰⁷ Theōréō (θεωρέω, verb, from *theáomai*), to be a spectator of, i.e. discern, gaze on for the purpose of analysing (discriminating), behold (Thayer, 1995).

¹⁰⁸ θεωροῦσα, γινῶναι (*Phaedo* 109e5). Ginōskō (γινώσκω = γιγνώσκω, verb), come to know, perceive, and in past tenses, know (Liddell & Scott, 1940), “to know, especially through personal experience (first-hand acquaintance)” (Thayer, 1995).

¹⁰⁹ γινῶναι ἂν ὅτι ἐκεῖνός ἐστιν ὁ ἀληθὺς οὐρανός καὶ τὸ ἀληθινὸν φῶς καὶ ἡ ὥς ἀληθὺς γῆ (*Phaedo* 109e5-110a1). Translated by Gwendalin Grewal. The italicised words are the inflection *alēthēs*.

The second message is that everything “comes to be and begetting”¹¹⁰ only after it “sees *alētheia*.”¹¹¹ Wherefore, everything “greatly desires” *alētheia*¹¹² and strives for it to “shine upon”¹¹³ like the Sun¹¹⁴ and be its source.¹¹⁵ Moreover, the turn to *alētheia* and the desire for it are not temporary or casual. These are the necessity and compulsion that the “What is *alētheia*?” *mēthodos* dictates. The *alētheia* “is not treated here as a property of the seeing/striving relation to being, but is rather identified with being and therefore with what is striven for.”¹¹⁶ To have/hold (*échō*) the upward way/road (*hodós*)¹¹⁷ is to bring to light (*phainō*) the being of *alētheia*¹¹⁸ and, first of all, the creative force, which the Greeks denoted by the verb *gígnomai*¹¹⁹ and the derived noun *gēnesis*.¹²⁰ *Gígnomai* and *gēnesis*, as well as words derived from them, are used as key terms in the presenting cosmogony and cosmology in Plato’s *Timaeus*.¹²¹

Finally, there is a third message. To gaze on (contemplate) (*theáomai*) *alētheia* means to be ready for “a fundamental change in orientation”¹²² and to continuously “turn about” (*metastréphō*).¹²³ While ascending, it is highly important not to lose *alētheia* as a landmark.¹²⁴ It is essential to become focused, to stop wandering elsewhere,¹²⁵ and to ever care for/attend to (*epimeléomai*) the right/righteous (*dikaíos*) measure (*métron*)¹²⁶ between *alētheia* and

¹¹⁰ γιγνόμενα καὶ γεννητὰ (*Timaeus* 28c2). The verb γεννάω means to beget (procreate a descendant), produce offspring; (passive) be born, “begotten” (Thayer, 1995).

¹¹¹ οὐ γὰρ ἦ γε μήποτε ἰδοῦσα τὴν ἀλήθειαν εἰς τόδε ἤξει τὸ σχῆμα (*Phaedrus* 249b4-5).

¹¹² Plato used the verb ἐπιθυμοῦμεν (*Phaedo* 66b5), “*epithyméō* (from ἐπί, “focused on” intensifying /*thymós*, “passionate desire”) – properly, to show *focused passion* as it aptly builds on (Gk *epi*, “upon”) what a person truly yearns for; to “*greatly desire* to do or have something – “to *long for*, to *desire very much*” (Thayer, 1995).

¹¹³ The verb καταλάμπω (*Republic* 6.508d4) to shine upon or over (Liddell & Scott, 1940).

¹¹⁴ The Sun Analogy (metaphor of the Sun) (*Republic* 7.507b-7.509c).

¹¹⁵ ὅταν μὲν οὐ καταλάμπει ἀλήθειαν τε καὶ τὸ ὄν (*Republic* 6.508d4-5). See (Gonzalez, 2009: 153).

¹¹⁶ (Gonzalez, 2009: 194).

¹¹⁷ τῆς ἄνω ὁδοῦ ἀεὶ ἐξόμεθα (*Republic* 10.621c4).

¹¹⁸ τί ποτε χρὴ φάναι πρὸς ἀλήθειαν εἶναι (*Philebus* 52d9). “What kind of thing is most closely related to *alētheia*.” Translated by Harold N. Fowler.

¹¹⁹ *Gígnomai* (γίγνομαι, verb) to come into being.

¹²⁰ *Gēnesis* (γένεσις, noun, from *gígnomai*) coming into being, production, generation.

¹²¹ According to A.F. Losev, “Only sometimes, instead of γίγνομαι, Plato uses the verb γεννάω, which means “to beget”, and in Greek, this term is primarily connected with the descent from the father (24d, 28b-c, 37c, 38c, 41a-b, 41d)” (Plato, V-3, 1994: 599).

¹²² (Gonzalez, 2009: 330).

¹²³ *Metastréphō* (μεταστρέφω, verb), turn about, turn round. “The metaphorical expression of “turning round” (περιστροφή and περιαγωγή, *Republic* 7.521c) the *psukhē* “upwards” (ἐπάνοδος)” (Fierro, 2003: 215).

¹²⁴ “There is probably some shortcut (κινδυνεύει τοι ὥσπερ ἀτραπὸς (*Phaedo* 66b3) ... and we claim this is *alēthēs* (φάμεν δὲ τοῦτο εἶναι τὸ ἀληθές (*Phaedo* 66b5-6). Translated by Gwenda-lin Grewal (2018).

¹²⁵ The verb πλανάω (πλανωμένων (*Sophist* 230b7), to cause to wander, to wander. A passage from the *Sophist* (230b4-d4), “in which the Eleatic Visitor stresses the necessity of the wandering soul’s being made aware of its wandering” was thought out by James M. Ambury (Ambury, 2018: 93-95).

¹²⁶ *Métron* (μέτρον, noun), “that by which anything is measured” (Liddell & Scott, 1940); “a *measure* (the actual measure *itself*); (figuratively) the *basis* for determining what is *enough* (or *not enough*), what is *fair* (or *not fair*), etc.” (Thayer, 1995).

lēthē.¹²⁷ Where the measure, *mētron*, is “not “measurement,” but “moderation” (Lat. *modus*, *modestus*) – designed to restore order in a sick body (Lat. *medeor* ‘care for,’ *medicus*) in the universe (Hom. *Zeūs (Idēthen) medēōn*, “Zeus the moderator”), in human affairs, including the most serious like war, or everyday things like a meal.”¹²⁸ It means that the “What is *alētheia*?” *mēthodos* is discerned (*theōréō*) as a force “that imposes limits on the unlimited, giving order to the universe”¹²⁹ “to take with authority measures appropriate to a present difficulty; to bring back to normal – by a tried and tested means – some particular trouble or disturbance.”¹³⁰ The Greeks denoted this power with the verb *phtheirō*, “to pass away, perish, be destroyed.”¹³¹ The result of right/righteous (*dikaíos*) and unright/unrighteous (*ádikos*) “to take measures” (*mētron*) and, therefore, way/manner (*trópos*)¹³² to pursue/practise (*epitēdeúō*) *alētheia*¹³³ was either “to be unmixed/pure (*eilikrinēs*),” or “never is (*ón*)” (not *óntos*).¹³⁴ “Whatever does not get hold of being cannot get hold of truth (*alētheia*).”¹³⁵

We use Plato’s messages and the dialectical way to follow (*mēthodos*) to bind on/lay hold (*ephaptō*) the “What is *alētheia*?” *mēthodos* and show forth/manifest (*emphanizō*) by *lógos* the “formula” for equal to *alēthēs*. “For we should not forget that *dikē* is a formula.”¹³⁶

§3. Modern cosmology discerns (*theōréō*) and comes to know (*ginōskō*) the “unconditioned *arkhē*” as the “initial singularity” that contains all the energy and spacetime of the universe.¹³⁷ It was followed by the “part of the Planck epoch,” or “the first second of the chronology of the universe.” The Lambda-CDM Cosmological Model is currently the most authoritative description of this period. The singularity is investigated as an active principle that causes “the accelerated expansion of the universe.” “Dark energy, in the form of a cosmological

¹²⁷ (*Republic* 10.621a5-b1). “The myths of the *Republic* and the *Phaedrus* recount two sides of the human destiny that necessarily go together: we are equally under the power of ἀλήθεια and λήθη, we emerge into this life from both the plain of ἀλήθεια and the plain of λήθη” (Gonzalez, 2009: 240-241).

¹²⁸ “In historical times the root **med-* designated a great variety of different things: “govern,” “think,” “care for,” “measure.” The primary meaning cannot be determined simply by reducing all these to a vague common denominator nor by a confused agglomeration of the historically attested senses. It can be defined as “measure” – not “measurement,” but “moderation” (Lat. *modus*, *modestus*) – designed to restore order in a sick body (Lat. *medeor* ‘care for,’ *medicus*), in the universe (Hom. *Zeūs (Idēthen) medēōn* ‘Zeus the moderator’), in human affairs, including the most serious like war, or everyday things like a meal” (Benveniste, 1973: 576).

¹²⁹ (McPherran, 2000: 103).

¹³⁰ “To give a rough definition of **med-*, we might say that it is “to take with authority measures appropriate to a present difficulty; to bring back to normal – by a tried and tested means – some particular trouble or disturbance”; and the substantive **medes-* or **modo-* will probably mean “the tried and tested measure which brings order into a confused situation” (Benveniste, 1973: 585).

¹³¹ *Phtheirō* (φθείρω, verb), to pass away, perish, be destroyed.

¹³² *Trópos* (τρόπος, noun, from *τρέπω*, turning, adopting a new manner), a new direction from taking a turn or adopting a new way/manner (Thayer, 1995).

¹³³ (*Apology* 36c4-36d1; *Phaedo* 66b3-6).

¹³⁴ τε μὴ ὄντος καὶ τοῦ ὄντος εἰλικρινῶς (*Republic* 5.479d4). See discussion (Burnyeat, 2003: 12-16; Ademollo, 2018: 61-62). The adverb εἰλικρινῶς is derived from the adjective εἰλικρινής (*eilikrinēs*).

¹³⁵ (Gonzalez, 2009: 194).

¹³⁶ (Benveniste, 1973: 558).

¹³⁷ (Sagan, 2013).

constant, makes up 71.4% of the universe, causing the expansion rate of the universe to speed up.”¹³⁸

Passing through modern cosmology into the past allows us to confidently state that just a few fundamental physical phenomena form both a changing “Order” in a broader philosophical meaning and an expanding universe in a narrower one of general relativity and quantum mechanics. Moreover, the proposition “Order leads the way/judges (*hēgēomai*)” brings to light (*phainō*) the fundamental phenomena as propositions that are complete on their own and not on a particular something forming the structure and/or functions of the “Order” (or the universe).

That is, the proposition “Order leads the way/judges (*hēgēomai*)” excludes the semantic completeness of the subject “Order” (or the universe), taken individually and in isolation.¹³⁹ The proposition context indicates the necessity for “combining verbs with nouns,”¹⁴⁰ consequently, the needness of a complete subject-predicate structure.

For this reason, fundamental physical phenomena and their meanings must be sought not in the mathematical description of a simple and a complex physical systems. Wherever “physical systems are divided into *types* according to their unchanging (or ‘state-independent’) properties, and the *state* of a system at a time consists of a complete specification of those of its properties that change with time (its ‘state-dependent’ properties).”¹⁴¹ With all due respect to mathematical formalism,¹⁴² it is not “the knowledge of how to deal with and use all these mathematical systems correctly.”¹⁴³

We are looking for fundamental physical phenomena in the context of the proposition “The Order leads the way/judges (*hēgēomai*).”

The proposition “Order leads the way/judges (*hēgēomai*)” both asserts and separates/defines (*horizō*) “all unmixed/pure (*eilikrinēs*), and this is equally *alēthēs*,”¹⁴⁴ and just as importantly, “without slipping into a psychological view of it.”¹⁴⁵

¹³⁸ <https://map.gsfc.nasa.gov/>

¹³⁹ I follow (Gottlob Frege, 1950; Wittgenstein, 1922) and the Kochen–Specker theorem.

¹⁴⁰ δηλοῖ γὰρ ἤδη που τότε περὶ τῶν ὄντων ἢ γιγνομένων ἢ γεγονότων ἢ μελλόντων, καὶ οὐκ ὀνομάζει μόνον ἀλλὰ τι περαίνειν, συμπλέκων τὰ ῥήματα τοῖς ὀνόμασι (*Sophist* 262d4-6). “For when he says that, he makes a statement about that which is (ὄντων) or is becoming (γιγνομένων) or has become (γεγονότων) or is to be (μελλόντων); he does not merely give names (ὀνομάζω), but he reaches a conclusion by combining verbs with nouns) Translated by Harold N. Fowler. See discussion (Gill, 2010: 183-184).

¹⁴¹ (Ismael, 2021).

¹⁴² “It is well known that his (Plato) writings are thickly sprinkled with mathematical terms and that he constantly tries to arouse admiration for mathematics among students of philosophy” (Karasmanis, 2020: 117).

¹⁴³ (Karasmanis, 2020: 135) with modification. “Arts involve skills that can produce opposite results. Therefore, for Plato, there is another and more significant knowledge: the knowledge of how to deal with and use all these arts correctly. This knowledge, or better wisdom, is a kind of moral and political knowledge. This is the knowledge of the royal art of the *Euthydemus* (290b, 292a–c) – where Plato says that the mathematicians do not know how to use their discoveries and must hand over the task of using them to the dialecticians (298c) – and also the one that the dialectician of the *Republic* possesses” (Karasmanis, 2020: 135).

¹⁴⁴ πᾶν τὸ εἰλικρινές, τοῦτο δ’ ἐστὶν ἴσως τὸ ἀληθές (*Phaedo* 67b1). *isōs* (ἴσως, from *isos*, equal), equally, in like manner (Liddell & Scott, 1940).

¹⁴⁵ (Gottlob Frege, 1950: §106).

The “What is *alētheia*?” *mēthodos* directly fastens/binds to (*háptō*) the meanings of the adjectives *katharós* and *eilikrinēs*. According to Plato, *katharós* and *eilikrinēs* shed light on the *alētheia* most of all.¹⁴⁶ Both adjectives have/hold (*échō*) unchanging (or ‘state-independent’) properties of the One. Only fundamental physical phenomena can express these properties ever.

Based also on the mathematical description of “the distinction between pure and mixed states” in quantum mechanics,¹⁴⁷ I postulate that the fundamental physical phenomenon is the basic unit of sense¹⁴⁸ in the “What is *alētheia*?” *mēthodos*. It is “everything unmixed/pure (*eilikrinēs*), and this is equally *alēthēs*”¹⁴⁹ and moreover, it is always and only *katharós*, and never non-*katharós*.¹⁵⁰ I understand the adjective *katharós*, physically clean, free from admixture and its inflection: the derived verb *kathairō*, and the derived noun *kátharsis*,¹⁵¹ as a particular guiding perspective that “leads/rules/governs/commands” (*árkhō*) from the *arkhē*.

Thus, the dialectical way to follow (*mēthodos*) helps to discern (*theōréō*) the fundamental physical phenomenon as always “seeing the whole together” (*synoptikós*)¹⁵² “to be complete on its own.”¹⁵³ The dialectical *phúsis*,¹⁵⁴ *synoptikós*,¹⁵⁵ binds on/lays hold (*epháptō*) of *katharós* and *eilikrinēs* in this particular case.¹⁵⁶

“For I put a boundary which separates/defines (*horízō*)”¹⁵⁷ the fundamental physical phenomena as the basic unit of sense in the “What is *alētheia*?” *mēthodos*,
and everything that ever is complete on its own.

Based on current knowledge, I identify two fundamental physical phenomena.

I will call the first fundamental physical phenomenon the “*gígnomai* phenomenon.” The proposition (1a) “X come to be (*gígnomai*)” asserts and separates/defines (*horízō*) its meanings, where X is a subject, and the predicate *gígnomai*, according to Myles Fredric Burnyeat, “is that of a verb which is complete on its own, but which is further completable

¹⁴⁶ (*Philebus* 52d9).

¹⁴⁷ “There is a kind of operator in Hilbert spaces, called a density operator ... So, even though it is common to speak as though pure states are represented by vectors, the official rule is that states – pure and mixed, alike – are represented in quantum mechanics by density operators” (Ismael, 2021).

¹⁴⁸ “According to the Context Principle, the basic unit of sense is the proposition, or sentence. The sentence is the smallest unit of language which can be used to say anything at all” (Lucas, 2015).

¹⁴⁹ (*Phaedo* 67b1).

¹⁵⁰ τε καθαρὰς ... ἀκαθάρτους (*Philebus* 52c1-2).

¹⁵¹ Kátharsis (κάθαρσις, noun, from *kathairō*), physically cleansing/purification (Liddell & Scott, 1940; *Sophist* 230b-e). See discussion (McPherran, 2007: 92-93; Capra, 2015).

¹⁵² Synoptikós (συνοπτικός, adjective), seeing the whole together, taking a comprehensive view, with a comprehensive view, synoptic (Liddell & Scott, 1940).

¹⁵³ εἰς μίαν τε ἰδέαν συνορῶντα ἄγειν τὰ πολλαχῇ διεσπαρμένα (*Phaedrus* 265d5); πείρα διαλεκτικῆς φύσεως καὶ μὴ: ὁ μὲν γὰρ συνοπτικός διαλεκτικός, ὁ δὲ μὴ οὐ (*Republic* 7.537c5-6). “In *Republic*, then, for all its grander and more elaborate metaphysical ambitions, dialectic still involves, at least in part, that search for the essence described and pursued in the earlier dialogues. What *Republic* adds (*Republic* 7.537c) is the point that the dialectician must be sunoptikos (συνοπτικός), capable of an overview of reality, of discerning the structure of the whole” (Brown, 2010: 152).

¹⁵⁴ διαλεκτικῆς φύσεως (*Republic* 7.537c5).

¹⁵⁵ συνοπτικός διαλεκτικός (*Republic* 7.537c6).

¹⁵⁶ I mean τῆς τοῦ ὄντος φύσεως (*Republic* 7.537c2-3).

¹⁵⁷ It is an imitation of Plato’s style, τίθεμαι γὰρ ὅρον ὀρίζειν (*Sophist* 247e3).

without change of meaning.”¹⁵⁸ *Gígnomai* – is (i) to become, i.e. to come into existence, begin to be, receive being, and (ii) to become equivalent to come to pass, happen, of events.¹⁵⁹

The *gígnomai* phenomenon is the particular “everything unmixed/pure (*eilikrinēs*), and this is equally *alēthēs*”; everything that ever is complete on its own. It “comes to be and begetting” and manifests itself according to the formula:

- (1b) “Everything that comes to be (*gígnomai*) comes to be (i) by the agency of something and (ii) from something and (iii) something”¹⁶⁰

I will call the second fundamental physical phenomenon the “*phtheirō* phenomenon.” It is asserted and separated/defined (*horízō*) by the proposition (2a) “X ceases to be (*phtheirō*),” where X is a subject, and I use the predicate *phtheirō* similarly to *gígnomai*, as a technical term. It gives me the right to extend Burnyeat’s idea to this verb.¹⁶¹

The *phtheirō* phenomenon is the particular “everything unmixed/pure (*eilikrinēs*), and this is equally *alēthēs*”; everything that ever is complete on its own. This is everything that “passes away and perishes.”¹⁶² According to the law of conservation of energy and Noether’s theorem, the *phtheirō* phenomenon manifests itself according to the formula:

- (2b) “Everything that ceases to be (*phtheirō*) ceases to be (i) by the agency of something and (ii) from something and (iii) something”

The *gígnomai* phenomenon and the *phtheirō* phenomenon are opposed. “We should all agree that the opposite of *gígnesthai* is *phtheiresthai*, should we not?”¹⁶³ The result of the apparent opposition between two fundamental phenomena¹⁶⁴ is the third phenomenon. I will call it the “*eimí* phenomenon.” The *eimí* phenomenon is asserted and separated/defined (*horízō*) by the proposition (3a) “X exists/is (*eimí*),” where X is a subject, and the predicate *eimí*¹⁶⁵ and its inflection¹⁶⁶ mean to be, to exist.¹⁶⁷

Modern physics and philosophy do not separate/define (*horízō*) the *gígnomai* and *phtheirō* phenomena. Both phenomena are investigated as an expression of the *eimí* phenomenon.

¹⁵⁸ (Burnyeat, 2003: 10). Therefore, *gígnomai* “is used sometimes with, sometimes without a complement: (1a) “x γίγνεται,” (1b) “x γίγνεται F”” (Burnyeat, 2003: 9). γίγνεται is the third-person singular present mediopassive indicative of *gígnomai*.

¹⁵⁹ (Thayer, 1995).

¹⁶⁰ “Everything that comes to be comes to be (i) by the agency of something (*Timaeus* 28a4-6) and (ii) from something (*Phaedo* 70c) and (iii) something” (Burnyeat, 2003: 18; 22-23) with modification.

¹⁶¹ In fact, “in ordinary Greek you do not say ‘X φθείρεται F’ to mean ‘X ceases to be F’” (Ademollo, 2018: 63).

¹⁶² Aristotle entitled one of his treatises “Περὶ Γενέσεως καὶ Φθοράς,” literally “On Coming to Be and Passing Away.”

¹⁶³ (*Philebus* 55a). Translated by Harold N. Fowler. See discussion (Ademollo, 2018; Burnyeat, 2003; Gonzalez, 2009; Vlastos, 2005).

¹⁶⁴ φθορὰν καὶ γένεσιν (*Philebus* 55a).

¹⁶⁵ ““x ἐστὶ” is “uncontroversially, complete statements;” the pass from ‘x ἐστὶ’ to ‘x ἐστὶ F’ “is not to change the meaning of the verb, but to add a complement to a verb that was already complete, but further completable.” Where x is a subject and F is some predicate) (Burnyeat, 2003: 9-10), the participle *óntos*, participle and noun *ón*, noun *ousiā*, etc.

¹⁶⁶ The participle *óntos*, participle and noun *ón*, noun *ousiā*, etc.

¹⁶⁷ Pay attention that in English, “to exist” was a late-comer in 1602 (Burnyeat, 2003: 21).

Based on the above, we can draw the following conclusion. The proposition “Order leads the way/judges (*hēgēomai*)” both asserts and separates/defines (*horizō*) the One as the “What is *alētheia*?” *mēthodos*. We have discursively thought through (*dialégesthai*) “What is *alētheia*?” and *dialektikē* leads us to the basic unit of sense that completely brings to light (*phainō*) *alētheia*. These are the propositions (1a) “X come to be (*gígnomai*)” and (2a) “X ceases to be (*phtheirō*), and fundamental physical phenomena, which they assert and separate/define (*horizō*).

As a result, we can call this place “the ultimate beginning” or otherwise the *arkhē*. It was from this top that Plato showed forth/manifested (*emphanizō*) by *lógos* of the fundamental messages that most of all bring to light (*phainō*) *alētheia*, *katharós* and *eilikrinēs*. No one else has gone higher into the past, as our current state of knowledge and understanding of unconcealed, as in the time of Plato, is limited to the inquiry of results, which are expressed by the proposition (3a) “X exists/is (*eimi*).”

1.2 What is *thémis/fas*?

§ 4. Now it is becoming clear that the “What is it?” question – *dialektikē* – developed by Socrates and Plato,¹⁶⁸ “goes through” (*dierkhomai*) the *eimi* phenomenon to propositions (1a) “X come to be (*gígnomai*)” and (2a) “X ceases to be (*phtheirō*),” but only to approach them closely and “turn about” (*metastréphō*) to gaze on (contemplate) (*theáomai*) their *kátharsis*, a guiding perspective.

Standing at the top of the ultimate beginning, each subsequent philosopher “gazes on (contemplates) as a spectator” (*theáomai*) the “crossroads” for the events that come to be (*gígnomai*) and cease to be (*phtheirō*). “Socrates’ dialectical method at work”¹⁶⁹ is, on the one hand, *synopsis* (a seeing all together):¹⁷⁰ to see how the same protagonists – the *gígnomai* phenomena and the *phtheirō* phenomena – show and say authoritatively in the “habitual” manner of (*dikēn*)¹⁷¹ the (3a) “X exists/is (*eimi*).” On the other hand, it is “division and bringing together”¹⁷² of new meanings of immeasurable value – equal to *alēthēs* – that the philosopher discerns (*theōréō*) in the spectacle that is played out.

According to Émile Benveniste, to show what must “to be”¹⁷³ or “to show and say authoritatively” is indicated by the noun *dikē*. “The root in question is **deik-*, which appears in Sanskrit as *diś-*, as *dis-* in Iranian, as *dic-* in Latin and *deik(numi)* in Greek. But these forms, though in perfect formal correspondence, do not agree in meaning, for Greek *deiknumi* means

¹⁶⁸ However, it was preceded by “early Pythagorean ethics, the acusmata (also called symbola), that is, the question-and-answer precepts apparently handed down by Pythagoras” (Horky, 2020: 170).

¹⁶⁹ “In speaking of Socrates’ dialectical method here I intend two limited historical claims: (i) that Socrates had an identifiable method, the method we see exhibited in Plato’s early dialogues; (ii) that this method is recognisably practised in the Theaetetus, albeit on a larger scale and with a content that reflects Plato’s own later concerns, including a concern with methodology, not the views of the historical Socrates” (Burnyeat, 2012: 3).

¹⁷⁰ *Synopsis* (σύνοψις, noun), a seeing all together, general view, whether with the eyes or mind (Liddell & Scott, 1940).

¹⁷¹ *δίκεν* (from *dikē*), in the manner of (Liddell & Scott, 1940). “The “habitual” manner is in reality an obligation of nature or convention” (Benveniste, 1973: 559).

¹⁷² τῶν διαίρέσεων καὶ συναγωγῶν (*Phaedrus* 266b5-6).

¹⁷³ “By comparing the forms Skt. *diś* and Latin *dicis causā*, we see that **dix* insists on the normative implications: *dicis causā* really means “according to a formal pronouncement,” or as we should say, “for form’s sake.” We might therefore define **dix* literally as ‘the fact of showing verbally and with authority what must be’” (Benveniste, 1973: 557).

“show” and Latin *dico* ‘say.’”¹⁷⁴ According to Joseph Thayer, the noun *dikē* probably derives from the verb δείκνυμι (to show). *Dikē* is custom, right (as self-evident), especially a judicial verdict which declares something that is approved or disapproved.¹⁷⁵

Hence it follows that the *dialektikē*, i.e. “Socrates’ dialectical method at work,” is “seeing with the mind (i.e. spiritually see)”¹⁷⁶ the meanings which two fundamental physical phenomena – the (1a) “X come to be (*gignomai*)” and the (2a) “X ceases to be (*phtheirō*)” – “give birth.” In our case, it would be the “division and bringing together” of *dikē*, the “formula which regulates one’s fate.”¹⁷⁷

In Greek, *dikē* is contrasted with *thémis*.¹⁷⁸ Furthermore, this contrast is preserved in Latin between *ius* and *fas*.¹⁷⁹ “The analysis of the uses of *dikē* has brought out the frequency of the correlations between the Greek *dikē* and the Latin *ius*. These two terms, although different in origin, enter into parallel series: *dikēn eipein* corresponds to *ius dicere*; *dikaïos* to *iustus*, and finally, *dikaspólos* corresponds more or less to *iudex*.”¹⁸⁰

We retain the “parallel series” of *thémis/fas* and *dikē/ius* to have/hold (*échō*) the upward way/road (*hodós*) into the past. Moreover, we use these “parallel series” and the contrast they create as institutional terms¹⁸¹ to bring to light (*phainō*) equal to *alēthēs*.

I will call a protected liberty or formula, which the propositions (1a) “X come to be (*gignomai*)” and (2a) “X ceases to be (*phtheirō*)” express in the “habitual” manner of (*dikēn*) the *eimi* phenomenon, by the Greco-Latin concept *thémis/fas*. From here on, we establish that the *thémis/fas* shows and says authoritatively¹⁸² the formula for protected liberty, which each of the two fundamental phenomena expresses in the “habitual” manner of (*dikēn*) the (3a) “X exists/is (*eimi*).” The *thémis/fas* shows/says the only rightful (*themitós*),¹⁸³ that is the “crossroads” between the meanings which are expressed by the propositions (1a) “X come

¹⁷⁴ (Benveniste, 1973: 555).

¹⁷⁵ *Dikē* (δίκη, noun). (Thayer, 1995).

¹⁷⁶ *Sýnopsis*, σύνοψις is συν and ὄψις, wherever ὄψις from ὀράω, verb “properly, see, often with metaphorical meaning: “to see with the mind” (i.e. spiritually see), i.e. perceive (with inward spiritual perception)” (Thayer, 1995).

¹⁷⁷ (Benveniste, 1973: 558-559).

¹⁷⁸ *Thémis* (θέμις, noun), that which is laid down or established, law (not as fixed by statute, but) as established by custom; justice, right (Liddell & Scott, 1940).

¹⁷⁹ “A further point which may be noted is that just as *dikē* contrasts with *thémis* in referring to human as opposed to divine law, so *ius* is opposed to that which the Romans called *fas*” (Benveniste, 1973: 561).

¹⁸⁰ (Benveniste, 1973: 561).

¹⁸¹ “Latin *dico* and Greek *dikē* together imply the idea of a formulaic law which lays down what is to be done in every particular situation” (Benveniste, 1973: 554).

¹⁸² “It is perfectly evident that *fas* must be brought into connection with the Lat. *fari* (Gr. *phēmi*, IE **bhā-*). Irreproachable from a formal point of view, this etymology requires semantic justification: how can a connection be established between “to speak” (**bhā-*) and “divine law” (*fas*)? It is shown that in fact the root **bhā-* designates speech as something independent of the person uttering it, not in virtue of what it means but in virtue of its very existence. Thus what has been said, Lat. *fatum*, or what is being said, *fama*, Gr. *phēmē*, Hom. *dēmou phēmis*, ‘vox populi’, is charged, as impersonal speech, with a positive religious value: *phēmē* is itself a god (*theós ... tis*) (Hesiod, *Works* 764). In Latin, the conditions in which *fas* is used – *fas est* + infinitive ‘the *fas* exists that ...’ – explain why (divine) speech provided the expression for (divine) law” (Benveniste, 1973: 589).

¹⁸³ *Themitós* (θεμιτός, adjective from *thémis*), “allowed by the laws of God and men, righteous” (Liddell & Scott, 1940).

to be (*gígnomai*)” and (2a) “X ceases to be (*phtheirō*),” and on which it is not allowed for “non-*katharós* to bind on/lay hold (*epháptō*) *katharós*.”¹⁸⁴

The *thémis/fas* “makes effective contrasts which illuminate (literally, “produce an epiphany”)”¹⁸⁵ the “habitual” manner (*dikēn*) to exist/be (*eimi*) equal/equivalent (*isos*) to *alēthēs*¹⁸⁶ and, consequently, complete on its own as far as possible. It helps to “come to know (*ginōskō*) through itself all unmixed/pure (*eilikrinēs*).”¹⁸⁷

At the same time, we denote the formula for the “habitual” manner of (*dikēn*) by the Greco-Latin concept *dikē/ius*. “In this way we can understand the adverbial use of *dikēn* “in the manner of,” that is to say, “according to the norm of a certain category of beings.”¹⁸⁸ The *dikē/ius* shows and says authoritatively derivative (emergent) properties or relations that have a direct effect on the meanings expressed by the proposition (3a) “X exists/is (*eimi*).” Fundamentally, the *dikē/ius* is a verdict which declares “a completed result of the *genesis*,” or the state-spaces of quantum mechanical systems (if in terms of quantum physics), either approved, i.e. *kathairō* or disapproved, i.e. non-*katharós*.¹⁸⁹

Thus, through the concepts of *thémis/fas* and *dikē/ius*, we fasten/bind to (*háptō*) together the logic of reality, from the modern understanding of fundamental phenomena and the physical reality they cause to the earliest meanings that have reached our time in writing.¹⁹⁰ We have/hold (*echō*) the upward way/road (*hodós*) into the past of at least 13.8 billion years and pursue/practise (*epitēdeúō*) *dialektikē*. This means that we are “coming to know (*ginōskō*) through ourselves all unmixed/pure (*eilikrinēs*)” as *historia*, that is, the multiplicity of guiding perspectives, whose Beginnings (*arkhē*) were what I call unconcealed, equal to *alēthēs* or equal/equivalent (*isos*) to *alēthēs*. *Historia* “played a major role in the teaching process taking place in the Academy.”¹⁹¹

¹⁸⁴ μή καθαρῷ γὰρ καθαροῦ ἐφάπτεσθαι μὴ οὐ θεμιτὸν ἦ (*Phaedo* 67b1-2).

¹⁸⁵ Latin *fari* and Greek *phēmi* are in strict correspondence. *phēmi* (from *phaō*, “shine”) – properly, *bring to light* by asserting one statement (point of view) over another; to speak *comparatively*, i.e. making effective *contrasts* which *illuminate* (literally, “produce an *epiphany*”) (Thayer, 1995).

¹⁸⁶ The interpretation τοῦτο δ' ἐστὶν ἴσως τὸ ἀληθές (*Phaedo* 67b1).

¹⁸⁷ γνωσόμεθα δι' ἡμῶν αὐτῶν πᾶν τὸ εἰλικρινές (*Phaedo* 67a7-b1).

¹⁸⁸ (Benveniste, 1973: 559).

¹⁸⁹ See (Benveniste, 1973: 564-565).

¹⁹⁰ I am referring to (Hesiod, 1914) *Works and Days* 240-264, where Krónos is the fundamental physical phenomena, Zeús, the son of Krónos is the “crossroads” of events, which the *thémis/fas* shows/says, and Δίκη, Διὸς ἐκγεγαυῖα (256), Dikē, the daughter of Zeús is what influences Zeús’ actions.

¹⁹¹ “As is well known, Plato was the first collector of books, even though, like his mentor Socrates, he had cast doubt on the importance of written discourse. Diogenes Laertius (54 D.L. 3.9.) speaks of Plato’s systematic quest for and manner of acquisition of various treatises, mainly containing Pythagoras’ theories when he was in Magna Graecia. It seems that Plato’s extensive collection of books played a major role in the teaching process in the Academy. Without the library, study of the pre-Socratic philosophers, of the Pythagorean mathematicians, of astronomy, geography and other disciplines would not have been possible. The Library of the Academy, that is the Exedra or Mouseion of Plato, must have been the model for the founding of such buildings in later times, such as the Library of Hadrian at Athens (Fig. 4.11). Aristotle, who was Plato’s student in the Academy for seventeen years, likewise created his own library in the school he founded in 335 BC, in the gymnasium of the Lyceum. His mentor and Plato’s school were the model for his teaching activity, but mainly for conducting his wide-ranging research and writing his extensive oeuvre. (56 Strabo, 13.100.608–9, refers to the library of the Lyceum as the most important private library of antiquity.)” (Lygouri-Tolia, 2020: 62-64).

Based on the above, the first Fundamental Right is always the *thémis/fas*. The *thémis/fas* shows/says “the base, foundation” (*thémethla*) for the “*génésis* and *phthorā*”¹⁹² or otherwise the *arkhē* where equal to *alēthēs* is born.

The unified meanings of the Greco-Latin *thémis/fas* concept, their history and fertility in common Indo-European, on the one hand, “are close to that of *thémethla* (in Homer *themeília*), which is a building term meaning “base, foundation.”¹⁹³ That is the *thémis/fas* shows/says the “base, foundation” of everything, that the proposition (3a) “X exists/is (*eimí*)” asserts and separates/defines (*horízō*). On the other hand, “If we look for a word corresponding to *thémis* which has the same sense, we find it in the derived neuter in *-man* made from the same root in Indo-Iranian: this is *dhāman* ‘law,’ the precise sense of which is, within the order prescribed by Mithra and Varuna, an ordinance relating to the house and to the family.”¹⁹⁴ That is, the *thémis/fas* shows and says authoritatively the two basic units of sense that precede the *eimí* phenomenon and come to know (*ginōskō*) through itself as *alētheia*, *katharós* and *eilikrinēs*. That is why the *thémis/fas* produces connotations of supernatural and mystical, including “creator,” “divine origin,”¹⁹⁵ “divine law,” and the like/resembling (*hómoios*).¹⁹⁶ The *thémis/fas* extends its influence over everything that exists/is (*eimí*) in the “habitual” manner (*dikēn*).¹⁹⁷

For our study, it is important to reemphasize that *thémis/fas* is not in itself the basis of existence/being. In its essence, it cannot base anything. The concept of *thémis/fas* is the fact of showing what must be with reality, which the propositions (1a) “X come to be (*gígnomai*)” and (2a) “X ceases to be (*phtheirō*)” express as a “formula” for their “habitual” manner (*dikēn*) of interacting with each other.

The *thémis/fas* shows/says the only rightful (*themitós*), namely the *arkhē* as a protected liberty (right¹⁹⁸) for derivative (emergent) guiding perspectives, which are asserted and separated/defined (*horízō*) by the proposition (3a) “X exists/is (*eimí*).” That is the essence of the so-called “nature of rights.”

§ 5. Thus, beginning with Plato, the “What is it?” – *dialektikē* – is developed as a particular way/manner (*trópos*) to “go through” (*dierkhomai*) the present into the past and demonstrate the right skills of the midwife. Philosophers actively participate in the birth of guiding perspectives that have the protected liberty (the right) to express themselves “in the “habitual” manner of (*dikēn*) the (3a) “X exists/is (*eimí*).”” In Plato’s *Theaetetus* (148e–151d), “Socrates compares himself to a midwife and his method of dialectical questioning to the

¹⁹² Phthorá (φθορά, noun, from *phtheirō*), passing out of existence, ceasing to be. Περί Γενέσεως και Φθοράς by Aristotle, Latin: De Generatione et Corruptione, literally “On Coming to Be and Passing Away.”

¹⁹³ (Benveniste, 1973: 549).

¹⁹⁴ (Benveniste, 1973: 550).

¹⁹⁵ “Further, *thémis* is of divine origin. Only this sense enables us to understand and unify uses which look very different. In the epic, what is understood under *thémis* is the prescription which lays down the rights and duties of each person under the authority of the chief of the *génos*, whether in everyday life or exceptional circumstances: alliance, marriage, war” (Benveniste, 1973: 550).

¹⁹⁶ *Hómoios* (ὅμοιος, adjective, from the same as ὁμοῦ – together, at the same place and time), like, resembling, the same as.

¹⁹⁷ For modern understanding see (Harris, 2015).

¹⁹⁸ “29. That a reality is the realization of the free will, this is what is meant by a right. Right, therefore, is, in general, freedom as idea” (Hegel, 2001: 46).

midwife's art of delivery."¹⁹⁹ The dialectical way to follow (*méthodos*) ascends into the *arkhē* and helps "to come to know (*ginōskō*) through oneself" *thémis/fas* through participation in the birth of equal to *alēthēs*.

To perfect the dialectical *phúsis*, *synoptikós*, is to ever "practice dialectics/discursively think through" (*dialégesthai*) *historía*, i.e. personal guiding perspectives whose Beginnings (*arkhē*) are shown/said by *thémis/fas* as equal to *alēthēs*.

Dialektikē "makes physically clean and free from admixture" (*kathairō*) the way to follow (*méthodos*) "What is *alētheia*?" It helps philosophers to overcome the "blindness of soul (*psukhē*)" and come to know (*ginōskō*) the "visible paradigm"²⁰⁰ that all derivative (emergent) properties or relations have/hold (*échō*). "The philosopher in the *Republic* has a clear model in his soul (*psukhē*) that distinguishes him from the soul (*psukhē*) that is blind (*Republic* 6.484c6). It is precisely this blindness of soul (*psukhē*) that dialectic is meant to overcome. The goal is similar in the *Phaedo* (99d4-e6)."²⁰¹

The dialectical method demonstrates the actual ability to separate/define (*horizō*) equal to *alēthēs* and, as a result, forms "those who can pass as a 'witness'" of current events between the *gígnomai* phenomenon and the *phtheirō* phenomenon.

Based on the above, I postulate that,

Equal to *alēthēs* is the freedom to express itself in the "habitual" manner of (*dikēn*) the (3a) "X exists/is (*eimí*)," and consequently to exist/be (*eimí*) complete on its own as far as possible

The *thémis/fas* shows/says authoritatively that equal to *alēthēs* is a derived (emergent) phenomenon, which I call the *eimí* phenomenon. The *eimí* phenomenon will never become complete on its own. At the same time, however, it has a protected liberty, the right to ever have/hold (*échō*) the property or relation "to make physically clean and free from admixture" (*kathairō*).

Thus, the *thémis/fas* or the First Fundamental Right shows/says,

Equal to *alēthēs* is everything that ever *kathairō*

I use the Greek verb *kathairō* to accentuate and recognise two historically determined meanings. First, the verb *kathairō* is derived from the adjective *katharós*, hence implies the direct opposition to non-*katharós*. I am referring, among other things, to the distinction between pure and mixed physical systems and their study in quantum mechanics. Second, the verb *kathairō* is "to make clean by *purging* (removing undesirable elements); hence, "pruned (purged);" eliminating what is fruitless by purifying (making *unmixed*); "to cleanse, properly, from filth, impurity, etc.; trees and vines (from useless shoots), to prune, John 15:2; metaphorically, from guilt, to expiate,"²⁰² i.e. it is an incomplete action to advance and protect *katharós* and, as a consequence, directed against non-*katharós*.

It follows that "in the "habitual" manner of (*dikēn*) the (3a) "X exists/is (*eimí*)" asserts and separates/defines (*horizō*) always and only equal to *alēthēs*, and it is everything that

¹⁹⁹ (Burnyeat, 2012: 21).

²⁰⁰ ἐναργὲς ἐν τῇ ψυχῇ ἔχοντες παράδειγμα (*Republic* 6.484c7). Also, see footnote 2, Paul Shorey (Cf. *Polit.* 277b, 277d, etc., *Soph.* 226c, *Parmen.* 132d).

²⁰¹ (Ambury, 2018: 91-92).

²⁰² (Thayer, 1995).

ever advances and protects *katharós* and “cleanses, properly, from” non-*katharós*. That is everything that ever *kathairō* and “is equally *alēthēs*” is not physically fundamental and will never become complete on its own. Nevertheless, it always leads/brings/carries (*ágō*)²⁰³ everything that ever makes like/resembles (*homoiōō*)²⁰⁴ *alētheia*, *katharós* and *eilikrinēs*.²⁰⁵ It corresponds to the personal guiding perspective that is determined at the “crossroads” for events and, therefore, is the only rightful (*themitós*). “Always the god leads/brings/carries (*ágō*) like/resembling (*hómoios*) to the like/resembling (*hómoios*).”²⁰⁶

“Socrates’ dialectical method at work” discerns (*theōréō*) everything that ever *kathairō* as the “base, foundation” (*thémethla*) for the world-whole and whole-part relationships, including gravity, the space-time geometry and the state-spaces of quantum mechanical systems. Everything that ever *kathairō* is understood as the *katharós* “measure,” the *métron*. The reader needs to remember that measure is “not ‘measurement,’ but “moderation” (Lat. *modus, modestus*)” and it acts as “Zeus the moderator” (*Zeùs (Idēthen) medéōn*)²⁰⁷ to advance and protect the only rightful (*themitós*).

Everything that ever *kathairō* becomes henceforward the “Zeus the moderator” articulating and enshrining the only rightful (*themitós*), namely the “habitual” manner of (*dikēn*) the (3a) “X exists/is (*eimí*).”

The Big Bang theory reveals a significant feature, which the propositions (1a) “X come to be (*gígnomai*)” and (2a) “X ceases to be (*phtheirō*)” express in the “habitual” manner of (*dikēn*) the (3a) “X exists/is (*eimí*)” and equal to *alēthēs*. Unlike Plato and his generation, modern philosophers gaze on (contemplate) (*theáomai*) everything that ever *kathairō* other than the “unconditioned *arkhē*” or the Ptolemaic cosmology. We know that the *gígnomai* phenomenon dominates the *phtheirō* phenomenon, and generally, their relationship is described by the standard cosmological model. It follows that proposition (3a) “X exists/is (*eimí*)” is constrained and obliged to express two fundamental properties or relations in the logic of reality.²⁰⁸

First, equal to *alēthēs* has the protected liberty (the right) always to have/hold (*échō*) the dominant “meaningful unit” of the *gígnomai* phenomenon and the “meaningful unit” of the *phtheirō* phenomenon. That is why everything that ever *kathairō* advances and protects the proposition “*Alētheia* leads the way/judges (*hēgēomai*).”²⁰⁹ Consequently, the “habitual” manner of (*dikēn*) the (3a) “X exists/is (*eimí*)” equals the “*Alētheia* leads the way/judges

²⁰³ Ἄγω (ἄγω, verb) I lead, bring (a person, or animal), guide.

²⁰⁴ Homoiōō (ὁμοιόω, verb, from *hómoios*), to assimilate, to become similar – be (make) like, resemble (Thayer, 1995).

²⁰⁵ (*Philebus* 52d9).

²⁰⁶ ὡς αἰεὶ τὸν ὅμοιον ἄγει θεὸς ὡς τὸν ὅμοιον (Hom. Od. 17.218). See (*Laws* 4.716c2 -3).

²⁰⁷ (Benveniste, 1973: 576).

²⁰⁸ In the meanings of Ludwig Wittgenstein (1922) and Diederik Aerts (2020), “Reality is not contained within space. Space is a momentaneous crystallization of a theatre for reality where the motions and interactions of the macroscopic material and energetic entities take place. But other entities – like quantum entities for example – ‘take place’ outside space, or – and this would be another way of saying the same thing – within a space that is not the three-dimensional Euclidean space.” The conceptuality interpretation allows one to push even further this statement, by observing that reality’s non-spatiality results from it being of a fundamental conceptual nature, implying the existence of a multilayered structure resulting from the interplay between states having different degrees of abstractness and concreteness” (Aerts et al., 2020).

²⁰⁹ ἀλήθεια δὴ πάντων μὲν ἀγαθὼν θεοῖς ἡγεῖται (*Laws* 5.730c1-2).

(*hēgēomai*).” This means that everything that ever *kathairō* is a “measure”²¹⁰ or otherwise “a physical quantity”²¹¹ in which the meanings, expressed by the proposition (1a) “X come to be (*gignomai*),” dominate the meanings expressed by the (2a) “X ceases to be (*phtheirō*).” As a result, everything comes to be (*gignomai*) “to make physically clean and free from admixture” (*kathairō*) the particular *katharós* “measure,” which the “base, foundation” (*thémethla*) for the “*génesis* and *phthorá*” produces as the personal guiding perspective. Everything that ever *kathairō* is a moderation (Lat. *modus*, *modestus*, *medeor*, *medéōn*) to exist/be (*eimi*) complete on its own as far as possible. “Platonic Greek for “X exists” is “X is something.””²¹² Consequently, the “*Alētheia* leads the way/judges (*hēgēomai*)” equals something that *kathairō* and that advances and protects a “measure” (“a physical quantity”) that includes the dominant “meaningful unit” of the *gignomai* phenomenon and the “meaningful unit” of the *phtheirō* phenomenon. That is why everything exhibits itself according to the formula:

(3b) Everything that exists/is (*eimi*) exists (i) by the agency of something and (ii) from something, and (iii) something²¹³

The second, equal to *alēthēs* has the protected liberty (the right) to exist/be (*eimi*) as a particular *mēthodos* “to make physically clean and free from admixture” (*kathairō*), where *-metá* and *-hodós* are the way/road (*hodós*) which to some extent directs.²¹⁴ Everything that ever *kathairō* has only two ways/manners (*trópos*) to make like/resemble (*homoióō*) *alētheia*, *katharós* and *eilikrinēs*. That is why everything comes to be (*gignomai*) either as a particular *mēthodos* “*kathairō*” or as a “never is (*ón*),” non-*katharós*. I have changed the fundamental ontological dichotomy to fit the Big Bang theory.²¹⁵ As a result, the “habitual” manner of (*dikēn*) the (3a) “X exists/is (*eimi*)” equals either a *mēthodos* “*kathairō*” or “never is (*ón*)” (non-*katharós*). Fundamentally, everything that ever *kathairō* exhibits itself according to the formula:

²¹⁰ “Thus the role of the supreme magistrate will have been to show the “measure” which is to be imposed in such and such a dispute. We have established that the law is a thing which has to be shown, said, or pronounced, which is expressed in parallel formations – Gr. *dikaspólos*, Latin *iudex*, Oscan *meddiss*, and Germanic *eosago*” (Benveniste, 1973: 587).

²¹¹ “A physical quantity is a mutually exclusive and jointly exhaustive family of physical properties. Knowing what kinds of values a quantity takes can tell us a great deal about the relations among the properties of which it is composed. The values of a bivalent quantity, for instance, form a set with two members; the values of a real-valued quantity form a set with the structure of the real numbers. This is a special case of something we will see again and again, viz., that knowing what kind of mathematical objects represent the elements in some set (here, the values of a physical quantity; later, the states that a system can assume, or the quantities pertaining to it) tells us a very great deal (indeed, arguably, all there is to know) about the relations among them” (Ismael, 2021).

²¹² εἴναι τι. “For examples of this use of εἴναι τι see *Phd.* 74a9-12, 102b1, *Rep.* 9.583c 5, 584d3, *Tht.* 157a3 and 5, *Soph.* 246e5, 247a9, *Tim.* 51b7-8, *Phlb.* 37a2-9” (Burnyeat, 2003: 16).

²¹³ (Burnyeat, 2003: 18).

²¹⁴ As an active “with,” a preposition *metá* (μετά) looks towards the *after*-effect (change, result) (Thayer, 1995).

²¹⁵ τί τὸ ὄν ἀεί, γένεσιν δὲ οὐκ ἔχον, καὶ τί τὸ γιγνόμενον μὲν (ἀεί), ὄν δὲ οὐδέποτε (*Timaeus* 27d6-28a1); “What is that which always is (*ón*) and has no *génesis*, and what is that which (always) comes to be (*gignomai*) and not ever (οὐδέποτε) is (*ón*)?” (Ademollo, 2018: 63) with modification. “ἀεί (always) is in brackets due to its controversial use in Plato’s original presentation” (Ademollo, 2018: 63- 66).

(3c) Everything that exists/is (*eimí*) exists either as a particular *méthodos* “*kathairō*” or as a “never is (*ón*),” non-*katharós*

Thus, “Socrates’ dialectical method at work” binds on/lays hold (*epháptō*) equal to *alēthēs* in the protected liberty (the right) to come to be (*gígnomai*) and exist/be (*eimí*) in the “habitual” manner (*dikēn*). It is always and only everything that ever *kathairō*, which has the right (protected liberty) to come to be (*gígnomai*) to exist/be (*eimí*) either both a particular *katharós* “measure” and a particular *méthodos* “*kathairō*,” or both a particular *katharós* “measure” and a “never is (*ón*),” non-*katharós*. In both cases, everything that ever *kathairō* comes to be (*gígnomai*) in the “habitual” manner (*dikēn*) to advance and protect the “*Alētheia* leads the way/judges (*hēgēomai*)” and “to exist/be (*eimí*) the unmixed/pure (*eilikrinēs*).”²¹⁶ It is Zeus himself makes like/resembles (*homoióō*) *alētheia*, *katharós* and *eilikrinēs* to exist/be (*eimí*) complete on its own as far as possible.

Following Plato, we will call everything that ever *kathairō* by the verb *dúnamai*, “to be able, strong enough to do.”²¹⁷ “For I put a boundary which separates/defines (*horízō*) being (*ónta*), that it is (*estin*) nothing else but *dúnamis*.”²¹⁸

As a result, the dialectical way to follow (*méthodos*) helps to discern (*theōréō*) that only *dúnamai* can exist/be (*eimí*).²¹⁹ We fasten/bind to (*háptō*) *historía* of a *dúnamai*. Next we will continue to “divide and bring together” both the space-time and physical systems.

§ 6. For several millennia, philosophers have been developing *dialektikí tekhnē*²²⁰ as “a kind of thinking”²²¹ to go through (*dierkhomai*) “the realm of things that are “never in the same state.””²²² The dialectical *phúsis*, *synoptikós* gazes upon (contemplates) (*theáomai*) *dúnamai* as various *katharós* “measures,” *méthodos* “*kathairō*” and “never is (*ón*)” (non-*katharós*).

General relativity and quantum physics strive to achieve a high mathematical precision in describing physical reality.²²³ At the same time, philosophy uses this mathematical *historía* to formalise the “habitual” manner of (*dikēn*) the (3a) “X exists/is (*eimí*)” and get the propositional formulas of the *thémis/fas* and *dikē/ius*. “Mathematics is not just mind-training for politicians (like chemistry or Latin grammar in modern times). It is the abstract study of certain good and

²¹⁶ τοῦ ὄντος εἰλικρινῶς (Republic 5.479d4), where in the adverb εἰλικρινῶς the leading connotations are “judged by sunlight, unalloyed, pure” (Thayer, 1995).

²¹⁷ (Liddell & Scott, 1940).

²¹⁸ τίθεμαι γὰρ ὅρον ὀρίζειν τὰ ὄντα ὡς ἔστιν οὐκ ἄλλο τι πλὴν δύναμις (*Sophist* 247e3). Translated by Harold N. Fowler with the modifications. The noun *dúnamis* (δύναμις) is a derivative of the verb *dúnamai*.

²¹⁹ τί δ', ἂν πάντα ἀλλήλοις ἐῷμεν δύναμιν ἔχειν ἐπικοινωνίας; (*Sophist* 252d4). “But what if we ascribe (*eimí*) to all things the *dúnamis* of participation in one another?” Translated by Harold N. Fowler. Continue to read also, ὡς τὸ πᾶν κινήσις ἦν καὶ ἄλλο παρὰ τοῦτο οὐδέν, τῆς δὲ κινήσεως δύο εἶδη, πλήθει μὲν ἅπειρον ἐκάτερον, δύναμιν δὲ τὸ μὲν ποιεῖν ἔχον, τὸ δὲ πάσχειν (*Theaetetus* 156a45-7). “The concept of δύναμις is crucial” for “everything in the world is change” (Giovannetti, 2022: 156).

²²⁰ διαλεκτικὴ τέχνη (*Phaedrus* 276e5).

²²¹ “Philosophers, according to Plato, employ a kind of thinking which he calls dialectic. His account of what this is differs strikingly in different works, but one aspect remains: it develops in *dialégesthai*, discussion. Philosophy always involves argument and discussion, ideally with others, and requires you to be able to defend your position against the arguments of others” (Annas, 2002: 83).

²²² (*Phaedo* 78c6-8, 79a9-10, 79c6-7). For the discussion See (Ademollo, 2018: 36-40).

²²³ See (French, 2019; Ismael, 2021; Kuhlmann, 2023; Myrvold, 2022).

beautiful structures which wise politicians will seek to realise in their own souls and in social life.”²²⁴

In philosophy of the cosmos, the *dúnamai* is discerned (*theōréō*) and come to be known (*ginōskō*) as *phúsis*, a *génos*²²⁵ and the cosmos/*agōn*. The latest achievements of quantum physics specify the *gēnesis* and its final result, namely the *katharós* (pure) and non-*katharós* (mixed) *génos*.²²⁶ That is, *phúsis* continuously and non-linearly leads/brings/carries (*ágō*) non-material (dark energy) and material *génos*²²⁷ into the cosmos, which is compared to the *agōn*.²²⁸ *Agōn* “was a unique creation of the Greeks in the ancient world. In the all kinds of *agōn* of Greece, they showed an unflinching spirit of antagonism, the Greeks made it legalization, rationalization and formalization. It is from this kind of spirit that the western thinking tradition of binary opposition was formed,” including *dialektikē*.²²⁹

The Greek noun *kósmos* conveys a double meaning: an “ordered system” and ornament. That is, the concept of cosmos denotes a particular *katharós* measure, *métro*n, which is derived (emergent) and consequently cannot be complete on its own, but which *phúsis* constrains and obliges to exist/be (*eimí*) complete on its own as far as possible. In turn, the noun *agōn* reveals the “habitual” manner of (*dikēn*),²³⁰ thanks to which the cosmos acts like everything that ever *kathairō*. Namely, the *phúsis* continuously and non-linearly leads/brings/carries (*ágō*) particular *génos* within the *agōn*. Each of them pursues/practises (*epitēdeúō*) the particular *méthodos* “*kathairō*” and thereby advances and protects the *hēgemonía*²³¹ of the cosmos as the particular *katharós* measure. *Phúsis* exists/is (*eimí*) equal to *alēthēs* only in this “habitual” manner of (*dikēn*).

The mathematical equations of Einstein’s general theory of relativity describe the cosmos/*agōn* as the particular *katharós* measure, the world-whole. Let us note that Einstein’s Field Equations²³² in general and through $G_{\mu\nu}$ (Einstein’s Tensor) and $T_{\mu\nu}$ (Stress Energy Tensor) expresses the measure (*métro*n) as a kind of compatibility condition between the meanings, which the propositions (1a) “X come to be (*gígnomai*)” and (2a) “X ceases to be (*phtheirō*)” assert and separate/define (*horizō*). It “restores order” (Lat. *Medeor, medicus*) in the cosmos/*agōn* and “brings back to normal” the guiding perspectives (events) occurring in it. The field equation describes the cosmos/*agōn* as complete on its own as far as possible.

²²⁴ (cf. *Rep.* 591c–592a, *Leg.* 967de) (Burnyeat, 2012: 172).

²²⁵ *Génos* (γένος, noun, from *gígnomai*), most general genus, “kin” (abstract or concrete, literal or figurative, individual or collective)

²²⁶ καθάρὰ γένη (*Philebus* 52e7). The nouns *génos* and *gēnesis* are derivatives of the verb *gígnomai*.

²²⁷ “...completed a census of the universe and finds that dark matter (matter not made up of atoms) is 24.0%”, whereas “ordinary atoms (also called baryons) make up only 4.6% of the universe.” <https://map.gsfc.nasa.gov/>

²²⁸ *Agōn* (ἄγών, noun) from verb *ágō*. *Agōn* “means that many people assemble in some place to have a contest” (Wang, 2010: 6805). See (Tell, 2011; Wang, 2010; Nagy, 2002).

²²⁹ (Wang, 2010: 6809).

²³⁰ “Panhellenic agon gives the Greeks a national identity first time in history, because in the polis system, there is no central government in Greece all the while, the Panhellenic agon became the only tie which united the Greeks together. It also became the line of demarcation between the Greeks and the non-Greeks. During the period of the Greek polis, this line is always very strict and clear, the non-Greeks have no qualifications and opportunities to take part in these games, until the Macedonian and Roman times” (Wang, 2010: 6807). I transfer this whole meaning to *katharós* and non-*katharós* *génos*.

²³¹ ἡγεμονία, from *hēgemōn*, leading the way, going first (Liddell & Scott, 1940). τῇ τῶν δυναστευόντων ἡγεμονίᾳ (*Laws* 4.711c9).

²³² $G_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$

The particular *katharós* measure creates universal obligations such as mass, gravity, space, and time. They are the only rightful (*themitós*). The FLRW metric is an exact solution to Einstein's Field Equations. It starts with the assumption of homogeneity and isotropy of space.

The FLRW metric describes the cosmos/*agōn* as simply connected, homogeneous, isotropic expanding or contracting state-space.²³³ It is also assumed that the spatial component of the metric can be time-dependent.²³⁴ The mathematical equations describe the gravitational field as an “adiabatic” process²³⁵ and processes that can cause both deceleration in the expansion of the state-space²³⁶ and acceleration in the expansion of the state-space.²³⁷

Quantum physics helps to discern (*theōréō*) two basic properties or relations in this *katharós* measure (*métron*). It brings to light (*phainō*) everything that ever *kathairō* as a physically real cosmos/*agōn*.²³⁸

First, these are the fields, i.e. physical systems with an infinite number of degrees of freedom. Quantum field theory forms the mathematical and conceptual framework that separates/defines (*horizō*) the concept of the “field” in the cosmos/*agōn*. Particle interpretation of quantum fields²³⁹ and field interpretation²⁴⁰ are prioritised in the understanding of “quantum fields.” Along with the development of a free field theory, quantum field theory describes the way/manner (*trópos*) in which a free particle interacts with the field that it generates itself and the interaction with other particles (fields). Furthermore, a quantum field theory describes the electromagnetic, weak and strong interactions (forces) and is an important part of the “standard model of elementary particle physics.”²⁴¹ It follows that everything that ever *kathairō*

$$^{233} ds^2 = -dt^2 + a^2(t)d\Sigma^2$$

$$^{234} -C^2dT^2 = -C^2dt^2 + a(t)^2d\Sigma^2$$

²³⁵ The equation is equivalent to the “First Law of Thermodynamics”

$$2(\ddot{a}/a) + (\dot{a}/a)^2 + (kc^2/a^2) - \Lambda c^2 = -(8\pi G/c^2)P$$

$$^{236} \rho = -3\dot{a}/a (\rho + P/c^2)$$

$$^{237} \ddot{a}/a = -4\pi G/3 (\rho + 3P/c^2) + \Lambda c^2/3$$

²³⁸ A conceptual decomposition that illuminates three possible ways to get from Classical Mechanics to Relativistic Quantum Field Theory is outlined in (Kuhlmann, 2023).

²³⁹ “A particle interpretation of QFT answers most intuitively what happens in particle scattering experiments and why we seem to detect particle trajectories. Moreover, it would explain most naturally why particle talk appears almost unavoidable. However, the particle interpretation in particular is troubled by numerous serious problems. There are no-go theorems to the effect that, in a relativistic setting, quantum “particle” states cannot be localized in any finite region of space-time no matter how large it is. Besides localizability, another hard core requirement for the particle concept that seems to be violated in QFT is countability” (Kuhlmann, 2023).

²⁴⁰ “the field interpretation seems to be much better off, considering that a field is not a localized entity and that it may vary continuously” (...) “Since “quantum fields” are operator valued it is not clear in which sense QFT should be describing physical fields, i.e., as ascribing physical properties to points in space. In order to get determinate physical properties or even just probabilities, one needs a quantum state. However, since quantum states as such are not spatio-temporally defined, it is questionable whether field values calculated with their help can still be viewed as local properties. The second serious challenge is that the arguably strongest field interpretation – the wave functional version – may be hit by similar problems as the particle interpretation, since wave functional space is unitarily equivalent to Fock space” (Kuhlmann, 2023).

²⁴¹ “The standard model of elementary particle physics” is sometimes used almost synonymously with QFT. However, there is a crucial difference. While the standard model is a theory with a fixed ontology (understood in a prephilosophical sense), i.e., three fundamental forces and a certain number of elementary particles, QFT is rather a frame, the applicability of which is open. Thus while quantum chromodynamics (or ‘QED’) is a *part* of the standard model, it is an *instance* of a quantum field theory, or short “a quantum field theory,” and not a part of QFT” (Kuhlmann, 2023).

is “quantum fields,” or in other words, interaction/force²⁴² with an infinite number of degrees of freedom. Interaction demonstrates its importance with the elementary, “fermions can become bosons only when they are bond by some kind of interaction, which as we know is in turn mediated by bosons. This means that, strictly speaking, fermions alone cannot form a boson: we cannot construct bosons without bosons.”²⁴³

Plato wrote that the cosmos is the combination of the *anánkē* and *nóos*.²⁴⁴ Therefore, I will use the noun *anánkē*²⁴⁵ instead of the terms “interaction/force.” The *anánkē*, but not interaction/force, causes both constraint and necessity or both direction and magnitude. Its derivative verb *anankazō* “denotes the outward influence or pressure exerted by someone upon another. ... At times there is implied in *anankazō* the idea of “force,” thus it can even mean “to torture” someone.”²⁴⁶

Second, these are particles, i.e. physical systems with a fixed, finite number of degrees of freedom.²⁴⁷ Four basic principles of quantum mechanics describe the types and states of physical systems. These are physical states,²⁴⁸ physical quantities,²⁴⁹ composition²⁵⁰ and dynamics.²⁵¹ The attention is drawn to the difference between the understanding of a “particle” and a “quantum particle;”²⁵² to “the whole-part relationship and the question of the applicability of Leibniz’s Principle of the identity of indiscernibles in quantum theory.”²⁵³ The formulation

²⁴² Currently, the four fundamental interactions, also known as fundamental forces, are defined: the gravitational and electromagnetic interactions and the strong and weak interactions.

²⁴³ (Aerts et al., 2020).

²⁴⁴ οὗν ἡ τοῦδε τοῦ κόσμου γένεσις ἐξ ἀνάγκης τε καὶ νοῦ συστάσεως ἐγεννήθη (*Timaeus* 48a1-2).

²⁴⁵ *Anánkē* (ἀνάγκη, noun), necessity, compulsion, constraint (Liddell & Scott, 1940).

²⁴⁶ (Thayer, 1995).

²⁴⁷ “However, in quantum mechanics as it was developed at the hands of Schrödinger, for a system of two or more particles there are not individual wave functions for each particle, but, rather, a single wave function that is defined on n -tuples of points in space, where n is the number of particles. This was taken, by de Broglie, Schrödinger and others, to militate against the conception of quantum wave functions as fields” (Myrvold, 2022).

²⁴⁸ “Every physical system is associated with a Hilbert Space, every unit vector in the space corresponds to a possible pure state of the system, and every possible pure state, to some vector in the space” (Ismael, 2021).

²⁴⁹ “Hermitian operators in the Hilbert space associated with a system represent physical quantities, and their eigenvalues represent the possible results of measurements of those quantities” (Ismael, 2021).

²⁵⁰ “The Hilbert space associated with a complex system is the tensor product of those associated with the simple systems (in the standard, non-relativistic, theory: the individual particles) of which it is composed” (Ismael, 2021).

²⁵¹ “a. Contexts of type 1: ‘Schrödinger’s equation’ $H_\psi = E_\psi$; b. Contexts of type 2 (“Measurement Contexts”). Carrying out a “measurement” of an observable B on a system in a state $|A\rangle$ has the effect of collapsing the system into a B -eigenstate corresponding to the eigenvalue observed. It is known as the Collapse Postulate.” See (Ismael, 2021).

²⁵² “In formulating a quantum theory of some system, one usually begins with the Hamiltonian or Lagrangian formulation of the classical mechanical theory of that system” (Myrvold, 2022).

²⁵³ (Jaeger, 2014). “According to classical physics particles are basic building blocks of the world. These classical particles are distinguishable objects, individuated by unique combinations of physical properties. By contrast, in quantum mechanics the received view is that particles of the same kind (“identical particles”) are physically indistinguishable from each other and lack identity. This doctrine rests on the quantum mechanical (anti)symmetrization postulates together with the “factorist” assumption that each single particle is represented in exactly one factor space of the tensor product Hilbert space of a many-particle system” (Dieks & Lubberdink, 2022).

“to give a complete description of a physical system, then, we need to say what type of physical system it is and what its state is at each moment in its history”²⁵⁴ does not solve, but “turns” to the problem of “Identity and Individuality in Quantum Theory.”²⁵⁵ Following Plato, I call the second property or relation in the cosmos/*agōn* by the noun *nóos*.²⁵⁶ Where *nóos* is the individuality of the “quantum particle” (or “quantum object” more generally) in quantum mechanical systems.²⁵⁷ It follows that everything that ever *kathairō* is “quantum particles” with an individual, fixed, finite number of degrees of freedom or otherwise *nóos*.

Thus, for the time being, the general theory of relativity forms the mathematical and conceptual framework for the derived (emergent) *katharós* measure, the world-whole. It is called the “gravitational field” or the cosmos/*agōn*. Quantum physics, in its turn, forms the mathematical and conceptual framework for derived (emergent) properties or relations of this “measure” (*métron*),²⁵⁸ i.e. for particular *méthodos* “*kathairō*” and “never is (*ón*),” or in other words, whole-part relationships. I call them “physical systems” and *génos*, or physical systems/*génos*. Physical systems/*génos* can exist/be (*eimí*) either *katharós* or non-*katharós*.

Summarizing the above, we can concretise the fact of showing what is everything that ever *kathairō*. In an expanded formulation, the *thémis/fas* or the First Fundamental Right shows/says the only rightful (*themitós*):

Equal to *alēthēs* is *kathairō* that has the right (protected liberty) to come to be (*gignomai*) both as the world-whole (the *katharós* measure) and whole-part relationships (*méthodos* “*kathairō*” and “never is (*ón*)”) to exist/be (*eimí*) complete on its own as far as possible

The *thémis/fas* or the First Fundamental Right ultimately culminates in the first peremptory norm (*ius cogen*) for derivative (emergent) properties or relations:

The “habitual” manner of (*dikēn*) the (3a) “X exists/is (*eimí*)” is always and only *kathairō*, both the cosmos/*agōn* and physical systems/*génos* (*katharós* and non-*katharós*)

I will call it “the *thémis/fas* formula.” In the language of physicists, it means that,

The *thémis/fas* formula through space-time constrains and obliges matter how to move, and at the same time, through matter constrains and obliges space-time how to curve

I have paraphrased a well-known description of Einstein’s general theory of relativity from the physicist John Wheeler: “Space-time tells matter how to move; matter tells space-time how to curve.”

²⁵⁴ (Ismael, 2021) with modifications.

²⁵⁵ See (French, 2019).

²⁵⁶ *Nóos* was an important part of a Living Creature (ζῷον, *Timaeus* 30b). Therefore, Plato considered it as a cosmic phenomenon, which Gods, *daímōns*, and humans possessed to varying degree. For example, Plato used the expression θεοῦ νόησις, “intelligence of God” (*Cratylus* 407b). In the *Philebus*, Plato made clear that *nóos* ruled the cosmos from the very beginning, νοῦς ἀρχεὶ σύμμαχος ἐκείνοις (*Philebus* 30d).

²⁵⁷ See (Jaeger, 2014; Paul, 2017; French, 2019; Oldofredi, 2021; Dieks & Lubberdink, 2022).

²⁵⁸ Andrea Oldofredi proposes “a new metaphysical interpretation of Relational Quantum Mechanics (RQM)” and argues for “a property-oriented ontology” (Oldofredi, 2021). He develops the ideas of Carlo Rovelli and Laurie Ann Paul (2017).

1.3 What is *dikē/ius*?

§ 7. The *thémis/fas* or the First Fundamental Right shows/says a protected liberty, a right for the meanings expressed by the propositional formula

In the “habitual” manner of (*dikēn*) the (3a) “X exists/is (*eimí*)”

All expressed meanings represent the derived (emergent) logic of reality, *kathairō*, that is, both the cosmos/*agōn* and physical systems/*gēnos* (*katharós* and non-*katharós*). They clarify *phúsis* in itself, including both the space-time and physical systems.

The dialectical way to follow (*méthodos*) helps us “to come to know (*ginōskō*) through ourselves” that the proposition “Order leads the way/judges (*igeōme*)” expresses physical reality as everything that ever *kathairō*, which like “Zeus the moderator” “restores order” according to one’s own guiding perspective. It continuously and non-linearly begets (*gígnomai*) everything that ever makes like/resembles (*homoiōō*) *alētheia*, *katharós*, and *eilikrinēs*, and guarantees them the right (protected liberty) to advance and protect the *hēgemonía* of the “habitual” manner of (*dikēn*) to exist/be (*eimí*) complete on its own as far as possible. The *thémis/fas* formula describes this reality clearly and laconically. Hereafter, I will refer to the derived (emergent) reality as “the Two.”

That is to say, the One is fundamental phenomena (1a) “X come to be (*gígnomai*)” and (2a) “X ceases to be (*phtheirō*)” in themselves. The Two is derivative (emergent) properties or relations, created as the result of the interaction between the *gígnomai* and *phtheirō* phenomena.

In physics, the Two is studied as gravity, quantum fields, particles, etc. At the same time, philosophers more frequently investigate the Two as existence, being, and/or metaphysics²⁵⁹ and ontology,²⁶⁰ with a more professional approach.

However, our study “goes through” (*dierkhomai*) these concepts to the Academy, Plato, and earlier historical periods. We ascend to the top of the ultimate beginning to become the “witness” at the “crossroads” for the events that determine the meanings of the propositional formula “In the “habitual” manner of (*dikēn*) the (3a) “X exists/is (*eimí*).””

Standing on the top, we gaze on (contemplate) (*theáomai*) the “base, foundation” (*thémethla*) for the world-whole and whole-part relationships. We are compelled to draw on Niels Bohr’s experience²⁶¹ and propose a unified language for data analytics, ranging

²⁵⁹ Andronicus of Rhodes proposed the term “metaphysics” in the first century BC for ease of Aristotle’s works arrangement. Literally, it meant “something after physics.” Aristotle did not use the term. However, some of his works were actually devoted to the “first philosophy” (ἡ πρώτη φιλοσοφία). In the Middle Ages, the term “metaphysics” was used synonymously with the term “philosophy.” Metaphysics was regarded as the central philosophical doctrine.

²⁶⁰ In 1730 in his book “Philosophia prima, sive Ontologia” Christian von Wolff used the term “ontology” to specify general metaphysics. The new term derived from Greek *ontos* (ὄντος), translated as “that which is.” The first definition of the term “ontology” was given in 1613 in “Lexicon philosophicum: quo tanquam clave philosophiae fores aperiuntur” by Rudolph Goclenius. Wolff was a heavyweight philosopher of modern history, and one of the originators of a new understanding of the global world order. He created an ontology to the study of the category of being as initial and determinative. Metaphysics played a secondary role in the ontology: *knowledge* of soul, world, and God.

²⁶¹ “The Copenhagen interpretation was the first general attempt to understand the world of atoms as this is represented by quantum mechanics. The founding father was mainly the Danish physicist Niels Bohr, but also Werner Heisenberg, Max Born and other physicists made important contributions to the overall understanding of the atomic world that is associated with the name of the capital of Denmark” (Faye, 2019).

from contemporary research to prophetic visions and the knowledge of the past. In our study, Plato's *lógos* are the fundamental linguistic concepts by which the logic of physical reality – the Two – is discursively thought through (*dialégesthai*). “It is decisive to recognize that, however far the phenomena transcend the scope of classical physical explanation, the account of all evidence must be expressed in classical terms.”²⁶²

The dialectical *phúsis* and Plato's *lógos* bind on/lay hold (*epháptō*) of the appropriate balance between the *gígnomai* and *phtheirō* phenomena to structure and formalise the order to record data that the *thémis/fas* formula expresses. Furthermore, *synopsis* (a seeing all together) helps to discern (*theōréō*) that in the propositional formula “In the “habitual” manner of (*dikēn*) the (3a) “X exists/is (*eimī*)”” it is extremely important to know “What is the “habitual” manner of (*dikēn*)?”

From now on we turn about (*metastréphō*) to investigate the “habitual” manner of (*dikēn*). We literally understand *metastréphō*, turn about (turn round), where the main connotation belongs to the verb *stréphō*,²⁶³ “(figuratively) to convert by changing (switching) direction, i.e. go the other way (an “about-face”); taking an opposite or divergent course.”²⁶⁴

The dialectical *phúsis* is “an art of turning round/rotation (*periagōgē*),”²⁶⁵ and “the way/manner (*trópos*) turns about (*metastréphō*) easy and efficacious” is the basis of it.²⁶⁶ The art of turning round/rotation (*periagōgē*) is the only one capable of providing “passage through” (*dierkhomai*) the various personal guiding perspectives, *historía*, and at the same time, ever following one's own.

The dialectical way to follow (*méthodos*) turns about (*metastréphō*) and, as a consequence, we turn away from the Two as protected liberty, the right to exist/be (*eimī*) the world-whole and whole-part relationships. We do not pay attention to the meanings that the *thémis/fas* formula expresses as the increasing availability of Universe observation data, equal to *alēthēs*. We take for granted everything that ever *kathairō*, i.e. an observable reality as a spectacle that is played out. Instead, we gaze on (contemplate) (*theáomai*), the main distinguishing feature of a play and the actors. We focus on “What is equal to *alēthēs* in the “habitual” manner of (*dikēn*)?” We are only interested in the meanings that precede everything that the propositional formula “In the “habitual” manner of (*dikēn*) the (3a) “X exists/is (*eimī*)”” asserts and separates/defines (*horizō*).

As a result, we find the most effective guide for a proper understanding of the spectacle. Namely, we discern (*theōréō*) the main distinguishing feature that the propositions (1a) “X come to be (*gígnomai*)” and (2a) “X ceases to be (*phtheirō*)” express as the “base, foundation” (*thémethla*) for the *genesis* and *phthorá*. *Thémethla* in itself and its properties or relations is first and foremost a protected liberty, a right for the “habitual” manner of (*dikēn*) a play and the actors, and only then, it is everything that the *thémis/fas* shows/says authoritatively.

²⁶² “Later Niels Bohr expressed the same view in an often quoted passage: “It is decisive to recognize that, however far the phenomena transcend the scope of classical physical explanation, the account of all evidence must be expressed in classical terms. The argument is simply that by the word ‘experiment’ we refer to a situation where we can tell to others what we have done and what we have learned and that, therefore, the account of the experimental arrangement and of the results of the observations must be expressed in unambiguous language with suitable application of the terminology of classical physics (APHK, p. 39)” (Faye, 2019).

²⁶³ Μεταστρέφω, μετα-στρέφω.

²⁶⁴ (Thayer, 1995).

²⁶⁵ αὐτοῦ τέχνη ἂν εἴη, τῆς περιαγωγῆς (Republic 7.518d3).

²⁶⁶ τίνα τρόπον ὡς ῥᾶστά τε καὶ ἀνυσιμώτατα μεταστραφῆσεται (Republic 7.518d3-4).

The art of turning round/rotation (*periaōgōgē*) helps to bind on/lay hold (*epháptō*) equal to *alēthēs* in the “habitual” manner of (*dikēn*). We “come to know (*ginōskō*) through ourselves” that the “gravitational field,” “existence/being,” “metaphysics,” “ontology,” and even the cosmos/*agōn* cannot be investigated as “the base, foundation” (*thémethla*) for the *génesis* and *phthorá*. The above names are the meanings expressed by the *thémis/fas* formula, and which already include the “habitual” manner of (*dikēn*).

The dialectical *phúsis*, *synoptikós* discerns (*theōréō*) that everything that ever *kathairō* comes to be (*gignomai*) and “is equally under the power of *alētheia* and *lēthē*.”²⁶⁷ Subsequently, however, a few “drink a measure of the water” to exist/be (*eimí*) *méthodos* “*kathairō*,” while many “drank more than the measure”²⁶⁸ and become “never is (*ón*)” (non-*katharós*). Thus, everything expressed by proposition (3a) “X exists/is (*eimí*)” is divided into a few “winners” and many “losers,” where the “winner” exists/is (*eimí*) complete on its own as far as possible. Therefore, always and only the “winner” is equal to *alēthēs*.

Contemporary science and philosophy look for the cause of the separation in the meanings themselves, which are expressed by the proposition (3a) “X exists/is (*eimí*),” that is, existence/being in itself. However, the real cause of the division precedes the expressed meanings. All “losers” violate the *dikē/ius*, the “formula which regulates one’s own fate.”²⁶⁹

The Greco-Latin concept *dikē/ius* shows/says an essential clarification that precedes the proposition (3a) “X exists/is (*eimí*)” and determines the meanings it expresses. The *dikē/ius* shows/says that the proposition “Order leads the way/judges (*hēgéomai*)” constrains and obliges all derivative (emergent) properties or relations to protect, respect and fulfil the right to the “*Alētheia* leads the way/judges (*hēgéomai*).” This means that the proposition (3a) “X exists/is (*eimí*)” asserts and separates/defines (*horízō*) the Two as several physical “fields” and “particles.” However, only everything that is asserted and separated/defined (*horízō*) by the derivative (emergent) proposition “X *hēgéomai/duco*” has protected liberty, the right to exist/be (*eimí*) complete on its own as far as possible. Where the subject X is a particular *kathairō*, i.e. both the *katharós* measure and the *méthodos* “*kathairō*.” The predicate *hēgéomai/duco* is literally “to lead, command” and figuratively “to believe, judge, estimate.”²⁷⁰ Moreover, the Latin verb *duco* has/holds (*échō*) a crucial addition for the proposition. The verb’s meanings are based on the unchanging and changing properties of physical fields and particles, and the patterns and logical connections between them. “In sum, this proposal suggests that physical systems in Relational Quantum Mechanics should be defined as mereological bundles of properties, where (i) the intrinsic properties characterizing a certain species of particles have constant values, (ii) the extrinsic qualities take definite values relative to particular observers, and (iii) not every observable defining a system can have a definite value in virtue of the contextual nature of the quantum formalism.”²⁷¹

²⁶⁷ (Gonzalez, 2009: 240-241).

²⁶⁸ μέτρον μὲν οὖν τι τοῦ ὕδατος πᾶσιν ἀναγκαῖον εἶναι πιεῖν, τοὺς δὲ φρονήσει μὴ σωζομένους πλεόν πίνειν τοῦ μέτρου: τὸν δὲ αἰεὶ πίνοντα πάντων ἐπιλανθάνεσθαι (*Republic* 10.621a5-b1). “They were all required to drink a measure of the water, and those who were not saved by their good sense drank more than the measure, and each one as he drank forgot all things.” Translated by Paul Shorey

²⁶⁹ (Benveniste, 1973: 558-559).

²⁷⁰ “Latin *duco* and Greek *hēgéomai* have the same senses; the literal sense “lead, command” and the figurative sense “believe, judge, estimate” (Benveniste, 1973: 164).

²⁷¹ (Oldofredi, 2021).

That is why the *dikē/ius* is the imperative pronouncement of “authority” within the Two.²⁷² The *dikē/ius* proclaims *hēgemonía* of a “measure” (“a physical quantity”) in which the meanings expressed by the proposition (1a) “X come to be (*gígnomai*)” ever dominate the meanings expressed by the (2a) “X ceases to be (*phtheirō*).”

The *dikē/ius* mandates that *katharós*, including fields, particles, and the physical interactions between them,²⁷³ must be the *hēgemōn*,²⁷⁴ the one that ever leads and has/holds (*échō*) a personal guiding perspective. “...We have the notion of authority, which is included in the use of *dikē*.”²⁷⁵

The *dikē/ius* brings to light (*phainō*) the various historical events within the Two. First and most importantly, the *dikē/ius* shows/says meanings that are identical to the *thémis/fas* formula, which through space-time constrains and obliges matter how to move, and at the same time, through matter constrains and obliges space-time how to curve. Precisely, equal to *alēthēs* within the Two is not everything that ever *kathairō*, but only that which ever pursues/practises (*epitēdeúō*) the personal guiding perspective. It is the *hegemōn*²⁷⁶ who literally “leads, commands” (*hēgéomai/duco*) and consequently exercises the right to advance and protect both a particular *katharós* measure and a particular *mēthodos* “*kathairō*” better than others.

A history of at least 13.8 billion years, including the three thousand years of written history that we have/hold (*échō*) about a man, Earth’s evolution and the chronology of the universe, proves one thing: the proposition “X *hēgéomai/duco*” asserts and separates/defines (*horizō*) everything that ever *kathairō* as something physically real and consistent with Leibniz’s Principle of the Identity of Indiscernibles.²⁷⁷ It “does not drink more than the measure” because its “habitual” manner (*dikēn*) is the particular “measure” (*mētron*), which constrains and obliges particular physical systems/*génos* to fulfil an individual cluster of predicative changeability – *hēgéomai/duco* – always and only in a particular way/manner (*trópos*). That is why the proposition (3a) “X exists/is (*eimi*)” expresses everything that ever

²⁷² τῷ δὲ ἀεὶ συνέπεται δίκη τῶν ἀπολειπομένων τοῦ θεοῦ νόμου τιμωρός (*Laws* 4.716a2-3), i.e., the *dikē* as avenger of them that fall short of the divine *nómos*. Translated by R.G. Bury. See also (Benveniste, 1973: 557).

²⁷³ “We are arrived to another tenet of Relational Quantum Mechanics: information can be obtained only via physical interaction” (Oldofredi, 2021).

²⁷⁴ *Hēgemōn* (noun, ἡγεμών, от игеоме), one who leads (Liddell & Scott, 1940).

²⁷⁵ “Finally we come to the legal sense which is found in Oscan *meddix*. All the constituents of meaning can be found here, and they serve to bring out the equivalence observed between *med-* and *ius*: first we have the notion of authority, which is included in the use of *dico*. The central idea is that of a “measure” chosen from a traditional repertoire to be applied in a given case” (Benveniste, 1973: 586).

²⁷⁶ “in classical Greek, a word of very various signification: a leader of any kind, a guide, ruler, prefect, president, chief, general, commander, sovereign” (Thayer, 1995).

²⁷⁷ “The Identity of Indiscernibles is usually formulated as follows: if, for every property F, object x has F if and only if object y has F, then x is identical to y. Or in the notation of symbolic logic: $\forall F(Fx \leftrightarrow Fy) \rightarrow x=y$.

This formulation of the Principle is equivalent to the Dissimilarity of the Diverse as McTaggart called it, namely: if x and y are distinct then there is at least one property that x has and y does not, or vice versa.

The converse of the Principle, $x=y \rightarrow \forall F(Fx \leftrightarrow Fy)$, is called the Indiscernibility of Identicals. Sometimes the conjunction of both principles, rather than the Principle by itself, is known as Leibniz’s Law” (Forrest, 2020).

kathairō, but in fact, it is always particular *kathairō* that has/holds (*échō*) the *hēgemonía* of *katharós* in one's own "habitual" manner (*dikēn*).

It should be noted that the concepts of "authority" and *hēgemōn* are synonyms, although the linguistically accurate sequence is: the verb *hēgéomai*, the derived noun *hēgemōn*, and the following derived noun *hēgemonía*. It is this sequence that corresponds to *dikē/dico*.

The second, the *dikē/ius* focuses on the unchanging properties ('state-independent') and the changing properties ('state-dependent') of the *katharós* measure and *mēthodos* "*kathairō*." The *dikē/ius* shows/says that the unchanging properties "to have/hold (*échō*) the *gígnomai* phenomenon as far as possible" and the changing properties "to care for/attend to (*epimeléomai*) the *phtheirō* phenomenon" equally determine the finite number of degrees of freedom for a particular *katharós* measure and a particular *mēthodos* "*kathairō*." They are the *hēgemōn*. They "lead the way/judge (*hēgéomai/duco*)" the inherent property or relation to advance and protect one's own identity and individuality, that is, a particular *kathairō* in itself.

Finally, the third, the *dikē/ius*, shows/says the *hēgemonía* of constraints, the necessity for a particular *kathairō*, or in other words, the *hēgemonía* of the *anánkē*. A particular *kathairō* is always and only everything that pursues/practises (*epitēdeúō*) the particular constraints and necessity – *anánkē* – to make like/resemble (*homoiōō*) *alētheia*, *katharós*, and *eilikrinēs*. As a consequence, the *dikē/ius* shows forth/manifests (*emphanizō*) the right and duty to have/hold (*échō*) a finite number of degrees of freedom in the "habitual" manner (*dikēn*) to conform to Leibniz's Principle of the Identity of Indiscernibles.

From the above discussion, we conclude that the so-called "nature of law and justice (jurisprudence)" is an imperative pronouncement of constraints, necessity, or in other words, the *hēgemonía* of the *anánkē*. The *dikē/ius* shows/says that in the propositional formula "In the "habitual" manner of (*dikēn*) the (3a) "X exists/is (*eimí*)"" is dominated the meanings, expressed by the proposition "X *hēgéomai/duco*." Thus, the proposition "X *hēgéomai/duco*" asserts and separates/defines (*horizō*) the *hēgemonía* of protected liberty, the right for the "*Alētheia* leads the way/judges (*hēgéomai*)" and, as a result, the "habitual" manner of (*dikēn*) for the (3a) "X exists/is (*eimí*)" is nothing more than the right and duty to openly and legally imitate/follow (*miméomai*)²⁷⁸ the unmixed/pure (*eilikrinēs*)²⁷⁹ and, as a consequence, to advance and protect the dominant "meaningful unit" of the *gígnomai* phenomenon, i.e. the *anánkē*.

§ 8. The *dikē/ius* shows/says that equal to *alēthēs* has protected liberty, the right to have/hold (*échō*) the dominant "meaningful unit" of the *gígnomai* phenomenon and to care for/attend to (*epimeléomai*) the *phtheirō* phenomenon, but at the same time, it is constrained and obliged to do it better than others, "more authoritative." The *dikē/ius* shows/says the meanings that precede and determine the spectacle, which the *thémis/fas* or the First Fundamental Right shows/says as the freedom to express itself "In the "habitual" manner of (*dikēn*) the (3a) "X exists/is (*eimí*)."

We now understand that *thémis/fas* and *dikē/ius* are actually two different "facts of showing verbally and with authority what must be."²⁸⁰ The *thémis/fas* shows/says a protected

²⁷⁸ *Miméomai* (μιμέομαι, verb), to imitate, in the meanings of an identification and a reproduction. See (Capra, 2015).

²⁷⁹ ἁρμονίαν συμφωνεῖν (*Republic* 10.617b6). In the *Timaeus*, "to be in harmony" establishes *kósmos* (*Timaeus* 47c-48a); θείας ἁρμονίας μίμησιν (*Timaeus* 80b6), to imitate (*miméomai*) the divine harmony.

²⁸⁰ (Benveniste, 1973: 557).

liberty, a right for equal to *alēthēs*, which comes to be (*gígnomai*) “In the “habitual” manner of (*dikēn*) the (3a) “X exists/is (*eimí*).” Whereas the *dikē/ius* shows/says a protected liberty, a right for equal to *alēthēs* in the “habitual” manner (*dikēn*).

The *thēmis/fas* and the *dikē/ius* essentially show/say equal to *alēthēs*, that is, identical. However, in the first case, equal to *alēthēs* is asserted and separated/defined (*horizō*) by the proposition (3a) “X exists/is (*eimí*),” whereas in the second, by the proposition “X *hēgēomai/duco*.”

Neither “fact of showing” has an advantage since, in the first case, we gaze on (contemplate) (*theáomai*) the Two as a spectacle, in the second case, as a play and actors. Only the knowledge of the *thēmis/fas* and the *dikē/ius* helps to fully discern (*theōréō*) the derived (emergent) logic of reality and, therefore, the Fundamental Rights of equal to *alēthēs*, that is, everything that exists/is (*eimí*) complete on its own as far as possible.

Modern science and philosophy discern (*theōréō*) that the cosmos/*agōn* and physical systems/*génos* are derivative (emergent) properties or relations for the One, but at the same time, they are the basic units of sense for the Two and possibly for subsequent realities. “More precisely, the Kochen–Specker theorem entails that it is not possible to ascribe simultaneously well-defined values to all the observables attributable to a quantum system without generating contradictions. (...) For instance, in virtue of the quantum formalism, a certain particle will not have simultaneously well-defined position and momentum, although the properties of “having position” and “having momentum” can be ascribed to quantum objects. Consequently, the fundamental building blocks of our reality are defined as bundles of fused properties, where some of them remain metaphysically indeterminate in virtue of the contextual nature of quantum formalism.”²⁸¹

Various cosmological and physical models “exhibit side by side/compare”²⁸² the cosmos/*agōn* and physical systems/*génos* as the world-whole (the *katharós* measure) and whole-part relationships (*méthodos* “*kathairō*” and “never is (*ón*)”). As a result, modern physics brings to light (*phainō*) the gravitational, quantum and mechanical systems. Researchers have come close to conceptualising a “multilayered” reality that “states having different degrees of abstractness and concreteness.”²⁸³ A mathematical formalism and a network of physical concepts capable of providing a meaningful physical representation of these realities are just being formed.²⁸⁴ However, the mathematical and conceptual framework for the Two is being developed intensively. For example, understanding the physical system as a “property-oriented ontology” follows from an interpretation of quantum theory proposed by Carlo Rovelli and Andrea Oldofredi.²⁸⁵ Also, I take into account an alternative conception of quantum particles proposed by Dennis Dieks and Andrea Lubberdink. “One of its key consequences is that particles in quantum theory are not fundamental but emergent; another that once they have emerged, quantum particles are always physically distinguishable and

²⁸¹ (Oldofredi, 2021).

²⁸² Meanings of the verb *παράδεικνυμι* (Liddell & Scott, 1940).

²⁸³ (Aerts et al., 2020).

²⁸⁴ “In that respect, it is important to emphasise that a physical theory requires not only a mathematical formalism, but also a network of physical concepts coherently relating to the latter and capable of providing a meaningful physical representation of the reality the theory aims to describe” (Aerts et al., 2020).

²⁸⁵ (Oldofredi, 2021).

thus possess a physically grounded identity.”²⁸⁶ Laurie Ann Paul’s “mereological bundle theory” inspires and gives me confidence.²⁸⁷

In turn, what is most important for philosophy and what distinguishes it in world history is to benefit from the intelligible.²⁸⁸ Therefore, the ongoing debate over the concepts of “physical measure” (quantity) and “physical system” in quantum physics is an understandable desire to achieve phenomenally accurate descriptions of them. Since this discussion concerns quantum mechanics in the first place and not philosophy, many details, along with these terms, shall be omitted here. Our conceptualisation and empirical investigation of the *dikē/ius* will be based solely on the concept of “a particular *kathairō*” or, equivalently, a *hēgemōn gēnos*. Unlike quantum physics, philosophy quite clearly discerns (*theōréō*) and comes to know (*ginōskō*) the upward way/road (*hodós*) to the top of the ultimate beginning with a panoramic view of everything that comes to be (*gígnomai*) and ceases to be (*phtheirō*). It is that which is “the base, foundation” (*thémethla*) and the only rightful (*themitós*).

For philosophers, the ascent to the ultimate beginning, into the *arkhē*, begins with the awareness that “Properties and objects are the very same thing. We build fusions of properties from properties, and some of these are what we describe as “ordinary objects.””²⁸⁹ Further, “a certain long, jagged and uphill way/road”²⁹⁰ “goes through” (*dierkhomai*) the research of David Hume. “But setting aside some metaphysicians of this kind, I may venture to affirm of the rest of mankind, that they are nothing but a bundle or collection of different perceptions, which succeed each other with an inconceivable rapidity, and are in a perpetual flux and movement.”²⁹¹ His name is often mentioned in quantum physics. These are the so-called “bundle theory” and “mereological theory” and their influence on quantum mechanics.²⁹²

The dialectical way to follow (*méthodos*) leads to Gottfried Wilhelm Leibniz. Leibniz’s research is more fundamental and less understood by physicists. Leibniz’s key phrase, “that God is an absolutely perfect being, but its consequences are not sufficiently considered,”²⁹³ and its further development in the “Discourse on Metaphysics”²⁹⁴ precedes the modern understanding of the Two as emergent. Moreover, we find an explanation for the different understandings of the Principle of Sufficient Reason and its consequences, including the Principle of the Identity of Indiscernibles in philosophy and physics.²⁹⁵

Leibniz’s metaphysics, in turn, is a guiding perspective into the past, up to the recognition of Plato’s “authority.” “This reminds me of a beautiful passage of Socrates in Plato’s *Phaedo* which agrees wonderfully with my opinions on this point, and seems to be made expressly

²⁸⁶ (Dicks & Lubberdink, 2022).

²⁸⁷ (Paul, 2017).

²⁸⁸ ὄνησις (*Cratylus* 411d7), use, profit, advantage. See (*Sophist* 230c-d; Annas, 2002: 54-55; Gonzalez, 2009: 56-60; Karasmanis, 2020: 135-136).

²⁸⁹ “So there is no need for a categorical distinction between properties and objects. Properties are not “abstract,” or “dependent” or “incomplete” entities opposed to “concrete” or “independent” or “complete” objects in any ontological sense at all. Properties are not incomplete, while objects are complete. Properties do not need bearers to make objects. Properties and objects are the very same thing. We build fusions of properties from properties, and some of these are what we describe as “ordinary objects” (Paul, 2017: 45).

²⁹⁰ (*Republic* 2.364d3).

²⁹¹ (Hume, 2000).

²⁹² For example, (Paul, 2017; Oldofredi, 2021).

²⁹³ Translated by Gonzalo Rodriguez-Pereyra (Rodriguez-Pereyra, 2020: 7).

²⁹⁴ See (Rodriguez-Pereyra, 2020).

²⁹⁵ See (Forrest, 2020).

against our too materialistic philosophers.”²⁹⁶ In “Discourse on Metaphysics,” Leibniz quotes significant passages from two of Plato’s dialogues: *Phaedo* 97b-99e and *Meno* 82b-86c.

To rethink Plato equals to “go through” (*dierkhomai*) the context of the proposition “The Order leads the way/judges (*hēgēomai*)” and discursively think through (*dialēgesthai*) being itself, statics and kinetics,²⁹⁷ and the meaning of the phrase “But being can mingle with both of them, for they both exist/are (*eimi*).”²⁹⁸

Moreover, it is “living by what has been said.” “In Xenophon’s *Memoirs of Socrates*, Hippias tells Socrates that, instead of always asking questions about justice (right/righteous), he would do better simply to say, once and for all, what justice is. Socrates replies: “If I don’t reveal my views on justice in words, I do so by my conduct” (Xenophon, *Memorabilia*, 4, 4, 10). To be sure, Socrates was a passionate lover of words and dialogue. With just as much passion, however, he sought to demonstrate to us the limits of language. What he wanted to show us is that we can never understand justice (right/righteous) if we do not live it. Justice, like every authentic reality, is indefinable, and this is what Socrates sought to make his interlocutor understand, in order to urge him to “live” justice (right/righteous).”²⁹⁹

As a result, the dialectical *phūsis*, *synoptikós* gazes on (contemplates) (*theáomai*) the Two as a play and actors in themselves. In a stream of Universe observation data, it discerns (*theōréō*) the conceptual framework of the “habitual” manner of (*dikēn*) as “emergent”³⁰⁰ and/or of “mereological composition.”³⁰¹ It “comes to know (*ginōskō*) through itself” equal to *alēthēs*, namely, unchanging properties to have/hold (*échō*) the dominant “meaningful unit” of the *gígnomai* phenomenon and changing properties to care for/attend to (*epimeléomai*) the *phtheirō* phenomenon. Finally, and most important, it pursues/practices (*epitēdeúō*) particular constraints, necessity, *anáγκē*, to show by example how our knowledge of the *dikē/ius* can determine and give direction to (3a) “X exists/is (*eimi*).” “Socrates’ criticism at the beginning of the *Statesman* informs us of the crucial dividing issue that is completely and necessarily eclipsed in the Stranger’s divisions: the issue of worth, the issue of ethics, of how best to live, which in the *Gorgias*, for example, is the central issue in distinguishing the sophist from the philosopher. Aristotle also locates the difference between sophistry and dialectic in a “choice of life.””³⁰²

Let us investigate the conceptual framework of the “habitual” manner of (*dikēn*), which is inherent in everything expressed by the proposition (3a) “X exists/is (*eimi*).”

§ 9. The formalisation of unchanging properties to have/hold (*échō*) the dominant “meaningful unit” of the *gígnomai* phenomenon helps to distinguish three basic actions (interactions), which are both protected liberty, right, and necessity, compulsion. I postulate that the unchanging properties of a particular *kathairō* are the right and duty to seek (*zēteō*)

²⁹⁶ Translated by Gonzalo Rodriguez-Pereyra (Rodriguez-Pereyra, 2020: 26).

²⁹⁷ μέγιστα μὴν τῶν γενῶν ἃ νυνδὴ διήμην τό τε ὄν αὐτὸ καὶ στάσις καὶ κίνησις (*Sophist* 254d6).

²⁹⁸ τὸ δὲ γε ὄν μεικτὸν ἀμφοῖν: ἐστὸν γὰρ ἅμφω που (*Sophist* 254d14). Translated by Harold N. Fowler.

²⁹⁹ (Hadot, 1995: 155).

³⁰⁰ (Dieks & Lubberdink, 2022).

³⁰¹ (Paul, 2017; Oldofredi, 2021). “The central difference between my mereological bundle theory and traditional bundle theories is captured by the notion of qualitative parthood that my view employs” (Paul, 2017: 41).

³⁰² (προαίρεσις τοῦ βίου, *Metaph.* 1004b24–25) (Gonzalez, 2009: 60).

equal/equivalent (*isos*), to fasten/bind to (*háptō*) them in order to pursue/practise (*epitēdeúō*) together the maximum possible *anánkē*.

We must always consider and remember the double meaning of the concept of *anánkē*. On the one hand, the *anánkē* is the dominant “meaningful unit” of the *gígnomai* phenomenon, which *kathairō* ever advances and protects in the logic of reality. On the other hand, the *anánkē* is the necessity and compulsion that the *gígnomai* phenomenon produces for equal to *alēthēs*.

In other words, the proposition “X *hēgéomai/duco*” asserts and separates/defines (*horízō*) a particular *kathairō* as an individual way/manner (*trópos*) “to move (work) together as one,” in the yoke,³⁰³ to advance and protect the dominant “meaningful unit” of the *gígnomai* phenomenon. “In the verb *hēgéomai* we have the notion of the conduct of operations, implying calculation and planning; in *médōn* we feel primarily the notion of authority and secondly – in the same way as in Latin – the notion of a directing “measure.””³⁰⁴

The dialectical method helps to discern (*theōréō*) that the conceptual framework of a particular *kathairō* is actually formed by a few equal/equivalent (*isos*), which have the right to act (interact) as “an open system”³⁰⁵ and to be “the moderators” (*medéōn*). They ever advance and protect the individual cluster of predicative changeability as a norm. At the same time, to seek (*zēteō*) and to fasten/bind to (*háptō*) equal/equivalent (*isos*) so that together, in the yoke, to pursue/practise (*epitēdeúō*) *anánkē* as far as possible is their duty. Moreover, the attitude to their duties determines the “one’s fate” of a particular *kathairō*. Namely, it can either imitate/follow (*miméomai*) its own guiding perspective in a “habitual” manner and in this way/manner (*trópos*) to have/hold (*échō*) the dominant “meaningful unit” of the *gígnomai* phenomenon or lose it and become non-*katharós*.

Let us explain the above.

The proposition “X *hēgéomai/duco*” asserts and separates/defines (*horízō*) a particular *kathairō* as a few equal/equivalent (*isos*), where each new equal/equivalent (*isos*) is primarily a particular constraint and necessity to ever have/hold (*échō*) the dominant “meaningful unit” of the *gígnomai* phenomenon, or in other words, the maximum possible *anánkē*. The new equal/equivalent (*isos*) is a particular way/manner (*trópos*) “turns about” (*metastréphō*) to imitate/follow (*miméomai*) the guiding perspective (events) that the “base, foundation” (*thémethla*) produces as the only rightful (*themitós*).

It is time to explain why I use the *anánkē* concept rather than the terms “interaction/force.” On the one hand, the *anánkē* is “force, constraint, necessity,”³⁰⁶ so it satisfactorily conveys the meanings of the terms “interaction/force,” which are produced due to *génesis* and *phthorá*. On the other hand, the *anánkē* is “a compelling need requiring immediate action, i.e. in a pressing situation.”³⁰⁷ “*Anánkē* calls for timely help, i.e. strong force needed to accomplish something compulsory (absolutely required).”³⁰⁸

The use of *anánkē* clarifies that the proposition “X *hēgéomai/duco*” both asserts and separates/defines (*horízō*) the *hēgemōn génos* as a continuous and non-linear complication of

³⁰³ The meaning of the Greek ζυγός, “properly, a yoke; a wooden bar placed over the neck of a pair of animals so they can pull together; (figuratively) what unites (joins) two people to move (work) together as one” (Thayer, 1995).

³⁰⁴ (Benveniste, 1973: 584).

³⁰⁵ Modern open systems models link the organismic, thermodynamics and evolutionary models.

³⁰⁶ (Liddell & Scott, 1940).

³⁰⁷ (Thayer, 1995).

³⁰⁸ (Thayer, 1995).

the work in the yoke.³⁰⁹ Namely, a particular *kathairō* continuously and non-linearly leads/brings/carries (*ágō*) equal/equivalent (*isos*) to imitate/follow (*miméomai*) the events that are come to be (*gígnomai*) and cease to be (*phtheirō*). Every new equal/equivalent (*isos*) comes to be (*gígnomai*) as a “timely help” and “compelling need” for equal/equivalent (*isos*), which are already forming and pursuing/practicing (*epitēdeuō*) the “habitual” manner of (*dikēn*) a particular *kathairō*. The new equal/equivalent (*isos*) exerts an “outward influence or pressure”³¹⁰ on them all. It is not just “interaction/force” but “strong force needed to turn” all preceding equal/equivalent (*isos*) and together, in the yoke, imitate/follow (*miméomai*) unmixed/pure (*eilikrinēs*), and as a consequence pursue/practise (*epitēdeuō*) the maximum possible *anánkē*.

In this connection, it should be remembered that the Greek verb *miméomai*, imitate/follow, conveys both “the high level of personal (self) interest motivating” and “the positive imitation that arises by admiring the pattern set by someone worthy of emulation, i.e. a mentor setting a proper example.”³¹¹ The Platonic *miméomai* is very different,³¹² but at the same time, its meaning, first of all, is personified in Socrates, who, according to Plato, was “most right/righteous (*dikaíos*) of his time.”³¹³

Based on the above, I conclude that the right and duty to continuously and non-linearly lead/bring/carry (*ágō*) equal/equivalent (*isos*) to imitate/follow (*miméomai*) unmixed/pure (*eilikrinēs*) is the property or relation to appropriate and ever have/hold (*échō*) the maximum possible *anánkē*. This is the only rightful (*themitós*) way/manner (*trópos*) to make like/resemble (*homoiōō*) *alētheia*, *katharós*, and *eilikrinēs*. Therefore, it is equal to *alēthēs* in the “habitual” manner (*dikēn*).

Thus, the dialectical *phúsis*, *synoptikós* “comes to know (*ginōskō*) through itself” equal/equivalent (*isos*) as the basic structure in the “habitual” manner of (*dikēn*) a particular *kathairō*. Equal/equivalent (*isos*) is itself a constraint, necessity, “strong force needed to” imitate/follow (*miméomai*) unmixed/pure (*eilikrinēs*) and in this way/manner (*trópos*) to have/hold (*échō*) the dominant “meaningful unit” of the *gígnomai* phenomenon.

As a consequence, each new equal/equivalent (*isos*) is “to drink a measure of the water,” but not “to drink more than the measure.” It causes permutations, combinations and arrangements in the work of the yoke, but only to make it more effective. A new equal/equivalent (*isos*) is “Zeus the moderator,” which cleanses/purifies (*kathairō*) from non-*katharós* and “pulls together” the guiding perspectives of equal/equivalent (*isos*) with the guiding perspective of the unmixed/pure (*eilikrinēs*).

It follows that a few equal/equivalent (*isos*) are doomed to work in the yoke. Moreover, equal to *alēthēs* in the “habitual” manner of (*dikēn*) is always and only “to be forced (to do)” overall work,³¹⁴ to “move (work) together as one” to pursue/practise (*epitēdeuō*) the maximum possible *anánkē*.

In other words,

³⁰⁹ “In classical Greek many words take their stem from *anank-*” (Liddell & Scott, 1940).

³¹⁰ “The verb *anankázō* denotes the *outward influence* or *pressure* exerted by someone upon another” (Liddell & Scott, 1940).

³¹¹ (Thayer, 1995). *mimētēs* (“emulator, imitator”) “is always used positively in the NT (seven times) – of followers of Christ emulating a God-approved example. The supreme model is God Himself (see Eph 5:1)” (Thayer, 1995).

³¹² See (Capra, 2015), especially *mimēsis* and *enthousiasmos* (ἐνθουσιασμός).

³¹³ δικαιοτάτων εἶναι τῶν τότε (*Laws* 7.324e2). Δικαιοτάτων, δίκαιος + -τατων, superlative suffix.

³¹⁴ The verb ἀναγκάζω, *anankázō*, to be forced [to do] a thing (Liddell & Scott, 1940).

Equal to *alēthēs* in the “habitual” manner of (*dikēn*) a particular *kathairō* is the right and duty to lead/bring/carry (*ágō*) equal/equivalent (*isos*) to ever imitate/follow (*miméomai*) the unmixed/pure (*eilikrinēs*) and in this way/manner (*trópos*) to have/hold (*échō*) the maximum possible *anánkē*

I call this right and duty the “Second Fundamental Right.” It bases the unchanging properties of a particular *kathairō*.

The Second Fundamental Right ultimately culminates in a peremptory norm (*ius cogen*):

Don’t step over equal/equivalent (*isos*)

§ 10. The proposition “X *hēgéomai/duco*” asserts and separates/defines (*horizō*) unchanging and changing properties equally. Hence, the conceptual framework of a particular *kathairō* is also formed by the changing properties of “caring for/attending to (*epimeléomai*) the *phtheirō* phenomenon.”

Plato wrote that both the *eimí* phenomenon and *alētheia* are constrained and obliged to “drink a measure” but not to “drink more than the measure.”³¹⁵ Hence, it is critically important in the “habitual” manner (*dikēn*) to have relationships with the *phtheirō* phenomenon, not just with the *gígnomai* phenomenon. Both fundamental phenomena shape the identity and individuality of *génos*, but at the same time, the *phtheirō* phenomenon determines their actual denial. The verb *phtheirō* “literally means “waste away” (degenerate), “moving down from a higher level (quality, status) to a lower form.””³¹⁶

The formalisation of the changing properties of “caring for/attending to (*epimeléomai*) the *phtheirō* phenomenon” clarifies two basic actions (interactions), which are both the protected liberty, the right and the necessity, compulsion for the “habitual” manner of (*dikēn*) a particular *kathairō*. It is the right and duty to put into order/ornament (*kosméō*)³¹⁷ and to arrange (with or together)/put together (*syntássō*)³¹⁸ equal/equivalent (*isos*) and their work, *anánkē*, to not “corrupt, defile, destroy” (*phtheirō*) the yoke. I will call these properties or relations by the Greek noun “*nóos*.”

The *nóos* is “a particular mode of thinking and judging”³¹⁹ to care for/attend to (*epimeléomai*) right/just (*dikaíos/iustus*) to protect itself from *phtheirō*, “Probably strengthened from *phthio* (to pine or waste); properly, to shrivel or wither, i.e. To spoil (by any process) or (generally) to ruin (especially figuratively, by moral influences, to deprave) – corrupt (self), defile, destroy.”³²⁰ Where the Greek-Latin concept *dikaíos/iustus* clarifies the doctrinal and situational motives of “Zeus the moderator” (*Zeús (Idēthen) medéōn*) “to show the “measure” which is to be imposed in such and such a dispute,”³²¹ so as not to “corrupt, defile, destroy” (*phtheirō*) itself. “When Zeus is called *medōn*, this traditional epithet relates

³¹⁵ (*Theaetetus* 151d-179c; *Republic* 10.621a5-b1; *Laws* 4.716c5). For the discussion, see (Gonzalez, 2009; Oliveira, 2021).

³¹⁶ root (*pht-*) (Thayer, 1995).

³¹⁷ *Kosméō* (κοσμέω, verb, from *kósmos*), to put in order, arrange, make ready, prepare; to ornament, adorn (Thayer, 1995).

³¹⁸ *Syntássō* (συντάσσω, verb, from σύν and τάσσω), to put in order with or together, to arrange; to (put together), constitute, i.e. to prescribe, appoint (Thayer, 1995).

³¹⁹ (Thayer, 1995).

³²⁰ (Strong’s Exhaustive Concordance).

³²¹ (Benveniste, 1973: 587).

to the power possessed by the lord of the gods to apply the “measure” in given circumstances, on the occasion of a solemn oath or when help is required. We wish to secure his intervention in the resolution of a specific difficulty, since he has the power implied by the verb *médō*.³²²

The *nóos* comes “probably from the base of *ginōskō*,” so it provides the actions (interactions) “to come to know, recognise, perceive.”³²³ It is a particular mode of “coming to know, recognising, perceiving”³²⁴ the destructive interaction/force of the *phtheirō* phenomenon to “show, say or pronounce” the “measure” of right/righteous and unright/unrighteous (*ádikos*) and therefore the borders of the yoke, *dikaíos/iustus*. “We have established that the law is a thing which has to be shown, said, or pronounced, which is expressed in parallel formations – Gr. *dikaspólos*, Latin *iudex*, Oscan *meddiss*, and Germanic *eosago*. This gives us a means of measuring one of the great changes which occurred in the languages and institutions of the Indo-European peoples when law, going beyond its technical apparatus, was constituted of moral ideas, when *dikē* gave rise to the adjective *dikaíos*, when *ius* and *iustus* finally developed into the notion of *iustitia*.³²⁵

Thus, the *nóos* are the changing properties to advance and protect right/just (*dikaíos/iustus*) in the “habitual” manner of (*dikēn*) to ever “sound together/be in harmony (*symphōnéō*)”³²⁶ with the meanings expressed by the proposition (2a) “X ceases to be (*phtheirō*).”

Let us investigate the above.

According to the Copernican principle,³²⁷ no *génos* has an advantage. Hence, in the “habitual” manner of (*dikēn*) a particular *kathairō*, “complexity, with new “rules” governing optimised behaviour,”³²⁸ which independently forms the framework between the “individual and ensemble ontology,”³²⁹ or in other words self-organisation (self-assembly), has an important place.³³⁰ Continuously and non-linearly “restore order” (Lat. *medeor* ‘care for’, *medicus*)³³¹ in oneself and one’s relationship with the external can only be a particular *kathairō*, in which the *nóos* rules in the “habitual” manner (*dikēn*). The difference between the “measure” in *Theaetetus* 151d-179c and *Laws* 4.716c4-5 is that in the former, it is understood primarily as an *alētheia* criterion; in contrast, in the latter, it signifies the order and cohesion in the *eimí* phenomenon (the divine).³³² “Such a path and practice is available only to those who have drunk carelessness in the right measure, that is, just enough to care about the truth (*alētheia*) without possessing it.”³³³

³²² (Benveniste, 1973: 586).

³²³ (Thayer, 1995).

³²⁴ *Nóos*, “the mind, comprising alike the faculties of perceiving and understanding and those of feeling, judging, determining” (Thayer, 1995).

³²⁵ (Benveniste, 1973: 587).

³²⁶ *Symphōnéō* (συμφωνέω, verb), sound together, be in harmony or unison (Liddell & Scott, 1940).

³²⁷ In physical cosmology, the Copernican principle (the mediocrity principle) is a working assumption that demands that no place in the universe is preferred.

³²⁸ “For any open subsystem, ordering can lead to complexity, with new ‘rules’ governing optimised behavior” (Parke, 2020: 595).

³²⁹ See (Jaeger, 2014).

³³⁰ (Korkh & Khmil, 2024).

³³¹ (Benveniste, 1973: 576).

³³² See (Gonzalez, 2009; Oliveira, 2021).

³³³ (Gonzalez, 2009: 245).

The *nóos* “comes to know, recognises, perceives” the measure (*métron*) between *alētheia* and *lēthē*, and advances and protects it as “the measure of all things” in the highest degree.³³⁴ “*Métron* (“standard, measure”) is the controlling basis by which something is determined as acceptable or unacceptable – *preeminently* rooting to *the Lord Himself* as His being is the only ultimate measure of truth.”³³⁵ Thayer’s “*the Lord Himself*” is to be understood as “In the “habitual” manner of (*dikēn*) the (3a) “X exists/is (*eimī*).””

The *nóos* is the “intending and perceiving”³³⁶ underlying all equal/equivalent (*isos*). It is a cluster of organisational directives on internal oversight that allows to independently and without external direction put into order/ornament (*kosméō*) and organise (with or together)/ put together (*syntássō*)³³⁷ equal/equivalent (*isos*) and their work in the yoke.

Each new equal/equivalent (*isos*) is the “*strong force needed* to accomplish something *compulsory* (*absolutely required*)” and to prevent the work in the yoke from being “corrupted, defiled, destroyed” (*phtheirō*). He is the *hēgemōn*, the “authoritative” *médōn* who “shows the “measure” which is to be imposed in” *the relationship between* equal/equivalent (*isos*). At the same time, this measure has already established the personal guiding perspective of equal/equivalent (*isos*). It was and is the most competent and recognised in the yoke. “A particular mode of thinking and judging” of equal/equivalent (*isos*) helps to “come to know (*ginōskō*) through itself” the particular “measure of all things” in the highest degree” and hence to embrace, embody and express the constraints and obligations that each new equal/equivalent (*isos*) shows forth/manifests (*emphanízō*).

Equal/equivalent (*isos*) care for/attend to (*epimeléomai*) *dikaioi/iustus* in different ways and, as a consequence, possess various “modes of thinking and judging” (*nóos*). At the same time, each of them advances and protects always and only a particular ““measure of all things” in the highest degree,” which, as a result, becomes the controlling base and *nómimos*, “customary, prescriptive.”³³⁸ It becomes a yoke for equal/equivalent (*isos*) within a particular *kathairō*.

Thus, right/just (*dikaioi/iustus*), which is advanced and protected by the *nóos*, becomes a *historía*.

Right/just (*dikaioi/iustus*) becomes “X is something” that exhibits itself according to the formula (3b) Everything that exists/is (*eimī*) exists (i) by the agency of something and (ii) from something, and (iii) something, but with one very important modification “which regulates one’s own fate” of a particular *kathairō*. It ever has/holds (*échō*) the *arkhē* in its own “habitual” manner (*dikēn*) and pursues/practices (*epitēdeúō*) it as the customary/prescriptive (*nómimos*). In this case, the *arkhē* equals the “*Alētheia* leads the way/judges (*hēgéomai*).” The *arkhē* transforms into the controlling base, that is, the physically real and corresponding to Leibniz’s Principle of the Identity of Indiscernibles, the “habitual” manner of (*dikēn*) “sounding together/be in harmony” (*sympōnēō*) with the *phtheirō* phenomenon.

³³⁴ ὁ δὲ θεὸς ἡμῖν πάντων χρημάτων μέτρον ἂν εἴη μάλιστα (Laws 4.716c4-5). “In our eyes God will be “the measure of all things” in the highest degree.” Translated by R.G. Bury.

³³⁵ (Thayer, 1995).

³³⁶ See (Gonzalez, 2009: 29).

³³⁷ κοσμοῦσά τε καὶ συντάττουσα (*Philebus* 30c6).

³³⁸ *Nómimos* (νόμιμος, adjective, from *nómos*), conformable to custom, usage, or law (Liddell & Scott, 1940).

In this physical aspect, the meanings of *nóos* demonstrate their affinity with the meanings of *nómoi*.³³⁹ The *nóos* is the property to “come to know, recognise, perceive” the *phtheirō* phenomenon to “show the “measure” which is to be imposed in” *the work of the yoke, to advance and protect* the self-organisation (self-assembly) of the personal guiding perspectives of equal/equivalent (*isos*) based on right/just (*dikaioi/iustus*). At the same time, *nómoi* are the boundaries beyond which the *phtheirō* phenomenon rules.³⁴⁰ The *nóos* establishes and controls the *nómoi*. Thus, right/just (*dikaioi/iustus*) is created as a history of self-organisation (self-assembly) within particular boundaries, *nómoi*. It becomes identical and individual, physically real, and is further advanced and protected as the controlling base and the customary/prescriptive (*nómimos*) in the “habitual” manner of (*dikēn*) a particular *kathairō*.

Right/just (*dikaioi/iustus*) is “variable” or otherwise “changeable.” This means that the actions of “Zeus the moderator” predominate in the “habitual” manner of (*dikēn*) a particular *kathairō*. Above all, it ever advances and protects the individual way/manner (*trópos*) of having/holding (*échō*) the maximum possible *anánkē*. However, we have repeatedly shown above that *nóos* is invisibly present in all these actions. *Nóos* prevents equal/equivalent (*isos*) from wandering³⁴¹ between *gēnesis* and *phthorá* and having sunk into *lēthē*. *Nóos* constrains and obliges equal/equivalent (*isos*) to ever advance and protect right/just (*dikaioi/iustus*) as *the* measure of all things in the highest degree. As a result, in yoke work, ““like/resembling (*hómoios*) is dear to like/resembling (*hómoios*)” when it is moderate, whereas immoderate things are dear neither to one another nor to things moderate.”³⁴²

Thus, the changing properties “care for/attend to (*epimeléomai*) the *phtheirō* phenomenon” “come to be known (*ginōskō*) through themselves” as *nóos*, or in other words, “a particular mode” cares for/attends to (*epimeléomai*) right/just (*dikaioi/iustus*) as the measure of all things in the highest degree.

Equal to *alēthēs* in the “habitual” manner of (*dikēn*) a particular *kathairō* is the right and duty to care for/attend to (*epimeléomai*) right/just (*dikaioi/iustus*), or in other words, “a particular mode of thinking and judging (*nóos*)” *to advance and protect* self-organisation (self-assembly) of personal guiding perspectives of equal/equivalent (*isos*) always and only based on the particular ““measure of all things” in the highest degree”

I call this right and duty the “Third Fundamental Right.” It grounds the changing properties of a particular *kathairō*.

The Third Fundamental Right ultimately culminates in a peremptory norm (*ius cogen*):

Don’t step over right/just (*dikaioi/iustus*)

³³⁹ *Nómos* (νόμος, noun); *Nómoi* (νόμοι, plural), custom, law. The original title of Plato’s *Laws* is *Nómoi* (*Nómoi*). Furthermore, “by metonymy ὁ νόμος, the name of the more important part (i. e. the Pentateuch), is put for the entire collection of the sacred books of the Old Testament” (Thayer, 1995).

³⁴⁰ νόμος, νόμου, ὁ (νέμω to divide, distribute, apportion), in secular authors from Hesiod down, anything established, anything received by usage, a custom, usage, law (Thayer, 1995).

³⁴¹ Πλανάω, πλανωμένων (*Sophist* 230b7) (Ambury, 2018).

³⁴² ὅτι τῷ μὲν ὁμοίῳ τὸ ὁμοιον ὄντι μετρίῳ φίλον ἂν εἴη, τὰ δ’ ἄμετρα οὔτε ἀλλήλοις οὔτε τοῖς ἐμμέτροις (*Laws* 4.716c2-3). Translated by R.G. Bury with modification. Where μετρίῳ, ἄμετρα, ἐμμέτροις are derivatives of the noun μέτρον (*métron*), a measure.

Having regard to all the foregoing arguments, I postulate that the proposition “X *hēgēomai/duco*” both asserts and separates/defines (*horízō*) the unchanging and changing properties as equal to *alēthēs* in the “habitual” manner of (*dikēn*) a particular *kathairō*. In other words,

In the “habitual” manner of (*dikēn*) a particular *kathairō*, equal to *alēthēs* is the right and duty to “pull together” equal/equivalent (*isos*), but always and only based on right/just (*dikaíos/iustus*)

I call this definition the *dikē/ius* formula.

The *dikē/ius* formula is based on the Pythagorean Symbol “Don’t step over the yoke,”³⁴³ where the yoke is the “eternal” cyclical renewal, Ourobóros,³⁴⁴ to “move (work) together as one” and exist/be (*eimí*) complete on its own as far as possible.

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³⁴³ τὸ δὲ ζυγὸν μὴ ὑπερβαίνειν (Diogenes Laertius, 8.1.18). For the Pythagorean Symbols, the Pythagorean acusmata, see (Horky, 2020: 171). Diogenes Laertius calls the Pythagorean dogma (Πυθαγόρειον δόγμα) (Diogenes Laertius, 8.1.15). Edited by Robert Hicks (1972).

³⁴⁴ The ancient symbol of the ouroboros represents “the cycle of events understood to represent the creation of the world” (Van der Sluijs & Peratt, 2009: 5).

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The Biodiversification Resistor: Ramifications for Life on Extreme Exoworlds

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It is now well known that life can live in environments previously deemed too extreme; however, what constitutes extreme environments concerning life? It has been observed that there are environments with high species diversity and environments with low species diversity. Thus, the latter are the ones that have been deemed extreme. The relations between decreasing biodiversity and increasing extremity have been studied in this work, and several proportionality relations, and their ramifications for potentially inhabited exoworlds, have been clarified. Thus, it has been found that a biodiversification resistor exists as a boundary condition for life and that a biovelocity resistor exists as well as a boundary condition on inhabited worlds. Thus, the fact that the environment is extreme implies a lower biodiversity and a lower biodiversity entails a greater vulnerability to potential environmental changes, external as well as internal. This means that life in an extreme world does more poorly than in a relaxed world. Thus statistically, the number of inhabited extreme worlds will decrease compared to inhabited relaxed worlds. Based on the abstracted proportionality relations, a classification of worlds has been put forward: Population I worlds (no life), Population II worlds (biodiversity poor), and Population III worlds (biodiversity rich), where the proportionality relations allow to evaluate how the conditions for potential life elsewhere must be, and thus provides an essential tool for astrobiology.

Keywords: astrobiology, biotic shield, proportionality relations, biovelocity resistor, differential habitability, Population I, II, III worlds.

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1. Introduction

Astrobiology is the multidisciplinary field that investigates the deterministic conditions and contingent events with which life arises, distributes, and evolves in the universe (von Hegner, 2021). Thus, merely understanding life in a functional biology context, i.e., the physical,

chemical, or physiological responses of organisms here and now and the effect of environments here and now, is not sufficient. Adequate descriptions of life need the evolution and ecology of life as well.

This is important as it is now well known that life can live in environments previously deemed too extreme, which has gained significant interest. This gives reason for optimism regarding the existence of life on exoworlds previously deemed to be too extreme for life. Thus, with e.g., extremophiles in mind, extreme environments are no longer considered obstacles in astrobiology.

However, life existing in such environments comes with a built-in limitation that could be more evident, because what constitutes extreme environments? Defining what an extreme environment concerning life is can be challenging. A world like the Earth is characterised by many different environments and species. So even among potential Earth-like exoworlds, it is not straightforward to establish common characteristics regarding the nature, distribution, and size of different environments and the life present in them. There are of course different types of extreme environments on the Earth, meaning there are various environmental conditions, such as temperature, pressure, nutrients, pH, and saline concentrations, which can be high or low or vary significantly from each other. The same applies to extreme exoworlds, which in principle, can possess a multitude of different environments simultaneously or possess few environments, with implications for the potential life existing on them.

This work's approach to what constitutes extreme environments is that life and environments are intrinsically connected, and relaxed environments versus extreme environments with regards to life must be considered.

Some observations can be made. Thus, life exists in almost all environments on the Earth, but it is the case that multicellular life only exists in some environments, while unicellular life exists virtually everywhere. Thus, microbial life has a greater biodiversity than multicellular life. Therefore, a habitable environment on an extreme world may be defined as an environment where at least one known terrestrial extremophile can live. However, apart from being limited by being a geocentric definition, more than what given specific organisms are capable of is required.

Evolution is an adaptation to changing local environments. Thus, both the dynamics of life as well as environments are necessary to describe life in a world. Therefore, understanding what environments can do to life, and what life's response to environments means will be essential to clarify for searching for exoworlds where life can be expected. It has been observed that there are environments with high species diversity and environments with low species diversity. Thus, the latter ones have been suggested to be those that should be designated extreme (Brock, 1979). There is justification for this, as, e.g., life does exist in Antarctica, yet despite the large area here, the diversity of life is not high compared to the diversity in a rainforest. It is not puzzling that this is the case. There is a limit to what biomatter can do, especially when it first has to undergo adaptations. There is only so much e.g. a cell membrane or biopolymer can endure. While this is not puzzling, it still has consequences that can have significant ramifications, as extreme exoworlds with life can thus be expected to be poor with regard to biodiversity.

Of course, it has yet to be discovered how the distribution of life is in a galaxy like the Milky Way, and it is still open whether life even exists elsewhere in this solar system. However, here for the sake of argument, it will be assumed that life exists elsewhere and is distributed according to the Disparitas conjecture, in which microbial life is common in a galaxy, while multicellular life is rare in comparison (von Hegner, 2022). As mentioned, there are different types of extreme environments, but for the sake of argument, extremity in a generic sense will be implicitly used here unless otherwise noted.

Thus, in the following work, the relationship between decreasing biodiversity and increasing extremity will be investigated, and several proportionality relations and their ramifications for the research and search for potentially inhabited worlds in the galaxy and beyond will be abstracted.

2. Discussion

In this paper, Section 3 presents and clarifies how environments can increase or spread extremity in a world and the effect of this on life. Section 3.1 presents and explains how biodiversity can decrease due to an increasingly extreme environment but that cell density can increase. Section 3.2 presents and discusses that although the remaining life may be well adapted, it will still be at a disadvantage compared to life in relaxed environments. Section 4 presents and clarifies how the cell density can fall due to an even more increasingly extreme environment and that life can endure but not thrive in this environment. Section 4.1 presents and discusses that although the remaining life can exist in a large area abundant with energy sources, resources, and lack of competition, it does not benefit from it. Section 5 presents and discusses a classification of worlds where biodiversity-poor worlds, due to the proportionality relations, will statistically decrease over time in a galaxy in comparison to biodiversity-rich worlds. Finally, Section 6 summarises the results of this work and its implications for the research and search for potentially inhabited worlds in the galaxy and beyond.

3. Biodiversification Resistor

There are several definitions of what an extreme environment is with regard to life. It has been observed that there are environments with high species diversity and environments with low species diversity. It has therefore been suggested that those environments keeping low species diversity, in which entire taxonomic groups are absent, should be designated extreme (Brock, 1979). This is an ecological definition that was established for multicellular species. It was put forward before the importance of extremophiles in extreme environments became clear. However, the observation is still essential, as there is no reason why this should not apply to microbial life as well.

It is the case that the adaptability, robustness, and versatility of microbial life are higher than is of multicellular life. However, it still applies to them that there are environments with high species diversity and environments with low species diversity. Thus, in some environments, conditions, such as temperature, pressure, pH, nutrients, or saline concentrations, are extremely high or low, meaning that only a limited number of species exist.

A world can have many different environments; this is true for the Earth. For extreme exoworlds, there are two different points to address.

1. The different environments in a world may eventually have disappeared, leaving few large homogeneous extreme environments.
2. The different environments in a world, including relaxed environments, can eventually all increase in extremity, so there are many extreme environments.

There are two additional points to address regarding life and extreme environments.

1. In the first, life migrates ever closer to the extreme environment and constantly adapts to get further into it.
2. In the second, environments become more extreme, so the inherent life constantly adapts to them and becomes more extremophilic.

In both scenarios, the extreme environment acts as a parameter on evolution, forcing adaptation in an overall direction that evolution does not experience to the same extent in relaxed environments.

These points are essential to address for the purpose here because life occurs in its most rudimentary functional form, and this must occur in a relaxed environment. This is a boundary condition for life in any world (von Hegner, 2019; von Hegner, 2021). Thus, it applies to worlds that go from having different environments to few homogeneous or many extreme environments, that if life has arisen on such worlds, then those worlds must have originally had relaxed environments, even if they have since become extreme environments, as it applies that the native life either continually adapts to be able to get further into them, or emigrates ever closer to the extreme environment.

There are many different extreme environments, but when we talk about extreme exoworlds, we only mean worlds where life presumably has the opportunity to live. Thus, an extreme environment can be defined as one where at least one known terrestrial extremophile could live. However, this definition is very specific; it is an inductive inference. Thus, while being a practical working definition, it is limited due to the knowledge of extremophiles on the Earth.

A more generic definition is, as mentioned, that since there are environments possessing high species diversity and environments keeping low species diversity, those environments keeping low species diversity can be defined as being extreme. This second definition is general; it is a deductive inference. Thus, although nothing is yet known about potential life elsewhere, it will still be valid.

Thus, in the following, inhabited worlds will be discussed, where the existing environments increase to an extremity or the extreme environments are expanded so that only a few large homogeneous environments are left. Worlds with many different relaxed and extreme environments will be Earth-like in that respect, and therefore not so important to discuss here.

3.1. Cellular density

Section 3 mentions that environments with low species diversity can be called extreme. Life can exist in extremely high or low conditions, such as temperature, pressure, pH, nutrients, or saline concentrations. However, as a result, only a few species exist in those environments. This decrease in biodiversity is faster and more markedly in multicellular life, but it is still present in unicellular life.

Thus, it is the case that there is an arrow of extremity going from a rich biodiversity to a poor biodiversity. This, in turn, means that there is an arrow of biodiversity going from a relaxed to an extreme environment.

Thus, there is a direct proportionality between increasing environmental extremity and decreasing biodiversity. In other words, a direct proportionality exists between the environmental extremity increasing or expanding and the species variance decreasing, see Figure 1a.

If the number of environments in a world decreases, then the number of species also decreases, even though several different species can live in the same environment. But if the number of environments does not, but instead environments increase in extremity, then the number of species decreases.

So, there is the following relation:

$$\begin{array}{l} \text{relaxed environment} < \text{extreme environment} \\ \rightarrow \\ \text{high biodiversity} > \text{low biodiversity} \end{array}$$

Thus, an increasingly extreme environment means biodiversity decreases, and species centre around the mean in a Bell curve, see Figure 1a. Therefore, genetic diversity will be low in such environments, as the environment here pushes a low diversity, though, as only a few specific variants can cope with the environment.

But even if biodiversity decreases when the environment increases in extremity, it is still possible for the remaining species to be well adapted and thrive in these environments, i.e., they may grow at high cell densities. When one species disappears, there is more room for other species, and it can thus increase its cellular number. Thus, it follows here that in extreme environments, it can be the case that a species exists in high numbers but not a high number of species.

So, there is an inverse proportionality between many species, each in a limited cellular number and a limited number of species in a potentially large cellular number.

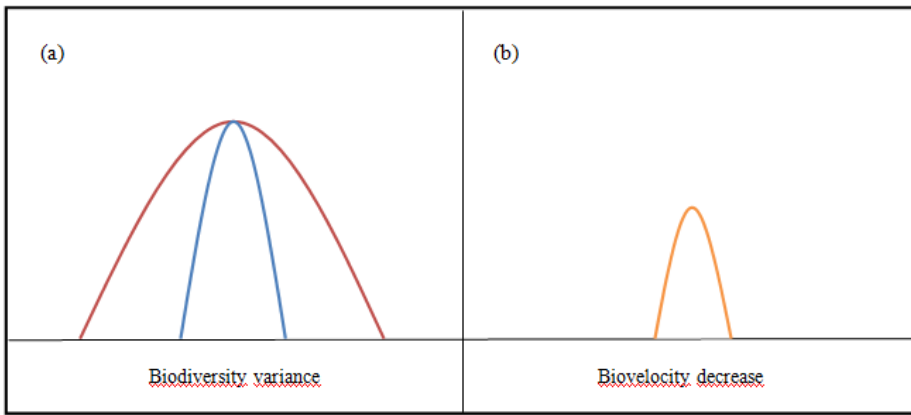


Figure 1. (a) Shows the red Bell curve with the wide biodiversity variance for life on the x-axis in relaxed environments. The blue Bell curve shows that the variance for life in extreme environments has shrunk on the x-axis but has the same centre position and height on the y-axis. (b) Shows the Bell curve for the biovelocity decrease, the low cell density in the more extreme environment, which has the same centre position on the x-axis as the other two curves but is shrunk even more and is shorter on the y-axis than the others.

Such extreme environments may still possess sufficient energy sources and building materials. Thus, for many species, each in limited cellular number, the species themselves and the resources keep the species in check in the same environment. In contrast, for a limited number of species in potentially large cellular numbers, it is mainly the resources that keep the species in check regarding cell density. So if one counts in cellular individuals alone rather than count in species, then there can potentially be an equal number of individuals on both sides of the extremity arrow, see Figure 2.

It can be thought that this decrease in biodiversity mainly applies to multicellular life, that the arrow of extremity going from a rich to a poor biodiversity is more characteristic of multicellular life than unicellular life. Indeed, microbial life is more adaptive, versatile, and robust than multicellular life, which could be different for them.

However, the increasingly extreme environment will mean that the microbial species will eventually centre on the genetic variants that can cope with the environment. Thus, quite a

few species might present here that will react to the increasingly extreme environment by being forced through convergent evolution into more and more uniform organisms. Of course, mutations will continue to occur, but since the environment only allows specific variants to make it, the environment will also maintain these. Thus, although different species may continue to exist here, the diversity between them will still decrease, as the focus will be on the phenotypes that can cope with the environment and the genotypes that make this possible. So ultimately, in this situation, there will be a group of species whose genetic split lies far back but which, through convergent evolution, have become virtually identical.

Of course, microbial life, such as bacteria, differs from multicellular life by, e.g., horizontal gene transfer. Thus, the species barrier is more fluent for them than for species limited to vertical gene transfer. So since the species concept is flexible here, one could say that microbial life in this way circumvents the environment and will push biodiversity down. Thus, a great diversity of species will be able to incorporate genes from this common gene pool, and by doing so, they will be able to achieve uniformity with each other in terms of being able to cope with the extreme environment, being able to incorporate the genes that allow them to cope with the environment. However, the fact that a large diversity of species will contain genes from the common gene pool will, in this situation, mean that the gene variance will decrease, centring on the genetic variants that can live in the environment. This means that the diverse gene pool will decrease to the mean on a Bell curve, while the specific gene pool will increase among the species and be fixed. In this situation, a very similar group of species can be found, whose genetic composition comes from diverse species but has now become an almost homogeneous group.

Thus, the species concept differs for microbial life from multicellular life. However, an increasingly extreme environment will ultimately lead to limited genetic variation or biodiversity. Therefore, when there are many different individuals, evolution in relaxed environments will select between the variants, and different species will gradually emerge.

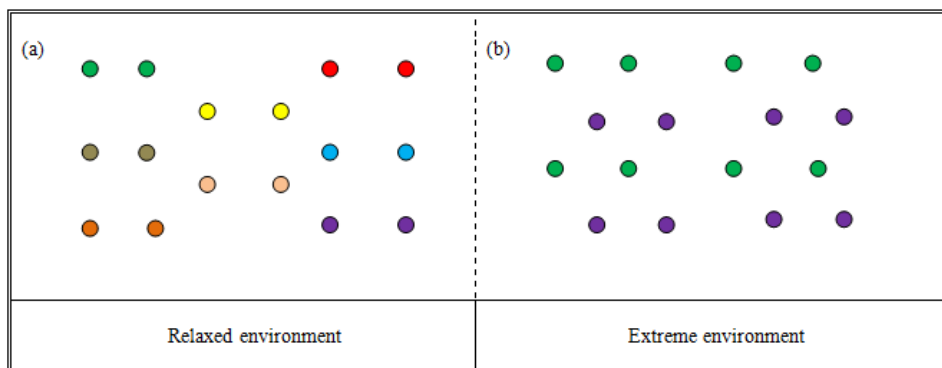


Figure 2. (a) Shows a relaxed environment where many different species exist, illustrated as dots in different colours. (b) Shows an extreme environment with decreasing biodiversity but a high compensating cell density. There are the same number of cellular individuals in both (a) and (b).

Even in these extreme circumstances, the mechanisms that allow different species to evolve eventually, to split off from one species, will be active.

Thus, for both scenarios, it will apply that even if a group of species can live in the environment in the same way, the increasingly extreme environment will eventually mean

that there will be a focus on the microbial species that can better cope with the environment, and among them will there gradually be centred on the genetic variants that can cope with the environment. Thus, a selection will take place between them, meaning that the number of species will gradually decrease, the species variance will decrease; in addition, the extreme environment limits the possibility of species diversification. The second scenario also applies that the uptake of genes is not necessarily the uptake of the useful genes to cope with the environment every time, so there will still be a selection between them, and the species will decrease in this situation.

Thus, species variance will decrease even for microbial life as environmental extremes increase. The extreme environment functions here as a fixed parameter, i.e., species will eventually be trapped around the mean on a Bell curve. There will be an inverse proportionality between the fact that biodiversity will decrease and the number of cellular individuals may increase.

Evolution has no preferred direction. So if an extreme environment with low biodiversity relaxes again, biodiversity can also increase again. This also applies to life that is present in the environment.

So there is an inverse proportionality between biodiversity decreasing or increasing as the extreme environment increases or decreases.

It is not static but dynamic. The variance of environments and biodiversity decreases and increases over time.

It will also be worth mentioning the disproportionality between mesophiles and extremophiles here. Thus, it could be thought that when there are many mesophiles in a relaxed environment, that there will also be many extremophiles in an extreme environment. But here, an inverse proportionality is seen between many mesophile species in a relaxed environment but few extremophile species in an extreme environment.

If the increase in extremities is slow, mesophiles can adapt to become extremophiles. If the extreme environment is relaxed again, then extremophiles can adapt to become mesophiles.

Thus, there is an inverse proportionality here: many mesophilic species decrease into a few extremophilic species in an extreme environment, while few extremophilic species can diversify into many mesophilic species if the environment is relaxed again.

Here it can be seen that a difference between extremophiles and mesophiles is that mesophiles can exist as many species, while extremophiles, in comparison, can only exist as a few species, even though the cellular number may be high.

So a boundary condition for life on such worlds is that extremity acts as a 'resistor' on biodiversification. Thus, a biodiversification resistor exists on inhabited worlds.

3.2. Variance and survival I

As discussed in section 3.1, the situation is that while there is a limited number of species in an extreme environment, this may be compensated by these few species being found in large cellular numbers, see Figure 2b.

Thus, there is an inverse proportionality between the number of species decreasing and the number of members of the same remaining species increasing.

As a first consideration, it can be thought that it is an advantage for a particular species both that its competitors in the form of other species disappear and that it gets space and resources to increase in cell number. It could thus become easier to live for the remaining life, even with high cell density, as extreme environments can still possess sufficient energy sources and building materials.

Thus, there could be a direct proportionality between the number of species decreasing and the possibility of survival increasing for the remaining species.

However, apart from the fact that the competition is tougher within a species than between species, in this situation, it also applies that the fact that there is an arrow of extremity going from a rich biodiversity to a poor biodiversity, in turn, means that there is also an arrow heading towards decreasing survival.

Thus, there is an inverse proportionality in that life increasingly endures an extreme environment, i.e., its variance decreases, and by that variance decreasing, life decreases at the same time the possibility of its long-term survival.

It is the case that a single remaining species, a single lineage, is not considered successful from an evolutionary point of view. Thus, bushes represent the correct topology of evolution, not individual twigs. Suppose a sizeable branching family or genus decreases its evolutionary variance to a single remaining species. In that case, that species is not considered successful, even if it survives for a considerable time. Thus, classic examples from the mammalian world are horses. These were once a prolific bush, yet only one genus, the *Equus*, with horses, zebras, and asses, remains, carrying the entire heritage of a group that previously dominated the history of hoofed mammals. They are single surviving twigs which are unsuccessful lineages from an evolutionary point of view (Gould, 1991). In contrast are rodents, bats, or antelopes, which are great success stories from an evolutionary point of view. They are prolific bushes with hundreds of surviving and thriving twigs (Gould, 1991). This scenario is even more profound if one moves from genus further up the eight major taxonomic ranks.

These classic examples are, of course, for multicellular species. But that, it will be presented here, also applies to microbial life, although it requires more extreme conditions before this becomes clear.

Bottleneck events exist, but these affect a relaxed world differently than on an extreme world. Life can diversify from the first but not from the second (von Hegner, 2021). Thus, although microbial life has several differences and the species concept is different for them, as discussed in section 3.1, it applies that as their gene pool in that situation gradually centres around the mean in a Bell curve, the situation will become the same for them.

This may appear paradoxical if this life is otherwise widespread in an extreme world. But even though there can potentially be the same number of individuals at each end of the extremophilic arrow, the survival possibility between them is different in the sense that one side is the number of species, and the other is the number of cellular individuals.

The remaining species are lines from a bush forced to trade their wide variance to single values to survive in the extreme environment. Evolution works by selecting between variants in a given local environment. But in this situation, the extreme environment keeps the number of variants, the wide variance, down. Here in the form of many similar members of the same species, the shrunk variance may be well adapted to their local environment, yet their numbers will not necessarily ensure their long-term survival. This is due to the fact, that as a species adapts to its environment, it is thus vulnerable to a rapid shift to other environments.

Thus, by trading the wide variance, species in this situation have become more vulnerable to planetary upheavals and environmental fluctuations than they are in relaxed environments, as the variance, the multitude of species, statistically ensures long-term survival, rather than individual species being maintained in the same form in the same environment.

So the existence of a species in high numbers, but not a high number of species in an environment, may not ensure against environmental fluctuations and a potential extinction event. From a purely physical perspective, this may be an unfamiliar way of viewing it. But

from an evolutionary point of view, this is the proper way because even though extreme environments may still possess sufficient energy sources and building materials, this is not the issue.

Because although life has the resources to increase its cell number, the issue is, apparently paradoxically, that it is not the number of cellular individuals that ensures long-term survival but the number of species.

Thus, a high number of similar individuals will have the same all-or-nothing response to the effect of a global environmental impact. Therefore, they will have a different possibility to survive the aftermath of an environmental impact than many different species that may have different responses. Thus, decreasing biodiversity means that the remaining life, even if found in a high cell density, has a more limited response to the aftermath of major planetary events. Thus, since worlds can experience environmental upheavals, and every species is vulnerable to sudden environmental changes, a plethora of species will statistically be better suited to cope with a special effect than a few species.

Thus, there is a direct proportionality between biodiversity and survival in the face of incoming environmental threats.

This can be illustrated through several different scenarios.

The Earth has experienced several environmental impacts over time. A relatively straightforward scenario was the asteroid that hit the Yucatan Peninsula in Mexico over 66 million years ago and formed the Chicxulub crater (Alvarez et al., 1980; Hildebrand et al., 1991), responsible for the Cretaceous-Paleogene extinction event, one of the five major extinction events that are usually mentioned. A high or low biodiversity is in the same situation if it exists in a limited area; however, if spread over a large area, it is in a different situation. Thus, a large number of individuals scattered around can ensure short-term survival in the event of an impact, as the impactor will necessarily hit a particular place in a world. Some life thus disappeared because it was in the impact centre and near the matter and energy deposit. However, long term, this will not necessarily save them. Most of the life that subsequently disappeared, an estimated 76% of all marine animal species and 40% of genera (Jablonski, 1994; Bambach et al., 2004), did so due to the impactor's effect, as the impact blast meant a global increase in extremity, i.e., although several reasons have been proposed, an important reason is that the impact injected large amounts of sulfur-bearing gases into the atmosphere, after which sulfate aerosols caused global cooling, sulfuric acid rain, and reduction of surface light for photosynthesis (Schulte et al., 2010; Gulick et al., 2019).

Interestingly, the impactor represented a relatively mild case, and its effect did not pose a real threat to Earth's life *per se*. However, this could have been different had the Earth's biodiversity been lower when the impact took place. Thus, the fact that many species disappeared while others did not was ultimate because the species that disappeared had the same overall all-or-nothing response to the environmental changes that the impactor caused. However, in this situation, a wide variety of biodiversity existed, which thus had different responses to environmental impacts, and therefore survived the Earth's life. If the impactor had been larger than 10 km in diameter when it struck the Earth (Brittan, 1997), or had a higher velocity, then the effect could have been so severe that biodiversity could have been reduced down to the microbial community and this could themselves have been reduced to single species, and the effect would have had a more profound influence on life *per se* on the Earth.

Another earlier and not-so-straightforward example of environmental impacts is the impact or impacts in the Hadean eon. Life may have arisen near the end of this (Bell et al., 2015). Thermophiles belong to the oldest known life (Gaucher et al., 2010). However, life

must necessarily have arisen as the simplest functional life possible in a relaxed environment (von Hegner, 2019; von Hegner, 2021). This means thermophiles were not the first life, as they are not the simplest functional life possible, but in fact are highly adapted organisms.

Thermophiles being the oldest known life yet cannot have been the first life shows that biodiversity already existed at a time when impacts eventually made them the oldest recorded life today. This biodiversity existed at a time when the Earth was still turbulent, with many impactors and much resurfacing of the planet itself. What happened may differ. An impact may have destroyed the relaxed and restricted subenvironment where the mesophiles lived, leaving only the thermophiles who had adapted to live in the planet's more widespread hotter environments. However, the impactors may also have caused the environment to increase in temperature rapidly.

If it was the latter scenario, mesophiles, but not thermophiles, ultimately disappeared because the former had the same overall response to the environmental changes the impactors induced. At that time, there may have been only limited biodiversity, a limited variation that thus had different but limited responses to environmental impacts, and therefore only thermophiles survived.

Evolution has no preferred direction, so when the extremity fell again, or rather that different environments arose again, extreme and relaxed, then the life that survived, which represent survivors' from what can be classified as the first – and overlooked – 6 extinction event, next to the five events usually mentioned, also gradually gave rise to mesophiles again, so biodiversity grew, and the variance spread again.

The Earth has also experienced environmental impacts not only from external impactors but from internal environmental impacts as well. Thus, the Great Oxidation Event (GOE) was a transformative event in which the Earth's atmosphere and the shallow ocean experienced a rise in O_2 between 2.4 and 2.1 billion years ago (Holland, 2002; Lyons et al., 2014). This event may have resulted from cyanobacterial activity, producing oxygen as a waste product, which accumulated in the atmosphere, thus leading to significant changes to the Earth system (Cloud, 1968; Lyons et al., 2014).

Thus, although this increase in extremity could be caused by life itself, due to cyanobacterial photosynthesis, and life was widespread at the time, biodiversity was low in the sense that the dominant life was anaerobic species. So most dominant species had the same singular response to the effect of what was for them highly toxic oxygen. This may have caused severe extinction events for the many anaerobic species on the planet (West, 2022). Thus, there was a decrease in biodiversity, and species disappeared while the species with other different responses to the environmental changes managed to survive.

Thus, the abundance of many species of life spread over a large area acts as an indirect shield against incoming impacts. This biotic shield is almost like a planet's magnetosphere or atmosphere, which acts as a direct shield by protecting life against the effects of solar radiation and cosmic radiation. This is because life relies on the backup of species and variants to ensure long-term survival.

One has a macro event in case of impact events that change the environment. Such external events present a challenge for all life. However, the higher the biodiversity, the greater the possibility of coping with it, as at least some species will be fit to cope. Nevertheless, even if such planet-wide impactors occur, it is estimated that impactors with a 3 km diameter strike the Earth every million years on average, while large 16 km objects happen approximately once every 100 million years (Paine & Peiser, 2002), so from the perspective of life, these are distant events that may or may not occur.

However, there are also more subtle internal events. Significant external events are not the only thing that affects the environment. Thus, an inhabited world is dynamic; its different environments have fluctuations over time that affects each other. Such micro events also affect life.

Even if the extremity increases, there can still be different environments, just as there can be different environments in a relaxed world. Thus, the environments do not necessarily become homogeneous but merely differ from the previous, more relaxed environment. Therefore, there may still be various environmental stressors, and environmental fluctuations may still occur. The increased extremity is itself an environmental stressor or stressors. It was the one that pushed biodiversity down to begin with. However, there will still be other stressors, which may be the same as before the environment increased in extremity.

Environmental stressors in the form of fluctuations affect the life that is in the environment, but this is an issue as biodiversity has decreased.

The fact that biodiversity has fallen means that the remaining species are, in a manner of speaking, maintained around the mean on a Bell curve. The remaining species are adapted and thrive in the environment, thrive in their particular mean of the bell curve, but since they are fixed, life cannot spread its variation along the curve's tails. Thus, as the biodiversity of the remaining species is maintained, and their specific gene pool is maintained, they cannot respond as well to the various environmental fluctuations through adaptation as the extreme environment maintains them.

Even if the increased extremity remains at this level, the fluctuations will continue to swing back and forth in the environments. Such fluctuations exist in all environments with life, relaxed as well as extreme, and while species can indeed manage to be stable over long periods, there will always be a natural push, their equilibrium pushed eventually.

However, the situation here is different, as the possibility of biodiversification disappears when the extreme environment increases. Their high cell density and their existence in potentially large areas can be a factor that helps ensure their long-term survival. Thus, in some parts of the large area, they can disappear by being impacted by the fluctuations, but in other parts where the fluctuations do not impact them, they can increase their cell density. Thus, life does not necessarily disappear under these circumstances; it can potentially endure over long periods given the right circumstances. Nevertheless, the continued existence of life depends on the number of species, not the number of cellular individuals.

So since life's ability to adapt and diversify is kept in check by the increased extreme environment, but the environmental stressors and fluctuations still act on them with potentially the same force, this means that life will be worse off than if it existed a relaxed environment.

This situation is very complex, with many variables and factors at play. However, the probability that the species' survival in extreme environments will decrease over time compared to species in relaxed environments can still be illustrated simply by modelling life as a game by rolling two dice.

Thus, in the following, there is, for the relaxed environment, a die with 1 pip on three faces and 5 pips on three faces. Thus, there are $X = \{1, 1, 1, 5, 5, 5\}$, where the numbers $\{1, 1, 1\}$ are the environmental stressors, and $\{5, 5, 5\}$ are factors for the species variance.

For the extreme environment, there is a die with 2 pips on four faces and 5 pips on two faces. Thus, there are $Y = \{2, 2, 2, 2, 5, 5\}$, where the numbers $\{2, 2, 2, 2\}$ are the environmental stressors, and $\{5, 5\}$ are factors for the species variance. As can be seen, the species variance has shrunk by a factor, while the stressors have increased for the extreme environment Y.

It is the case that the fluctuations swing back and forth over life, and these fluctuations are set here to be the same for both the relaxed environment and the extreme environment. For

the sake of simplicity, a distinction is made here between stressors and fluctuations. They may in fact be the same, or fluctuations may merely push the stressors and thus affect life. It also applies here that the fluctuations are the medium in which it takes place, i.e., the medium in which the dice are rolled.

So when both dice are rolled out in the same medium simultaneously, the fluctuations, stressors, and variance will all come into play. Thus, how will each die do to the other, that is, which die is affected the most or is more likely to have the high roll?

Since the given dice possess the same number of pips, it could thus appear possible that both dice might have an equal probability of having the high roll. However, while the situation in the relaxed environment and that in the extreme environment is similar in terms of fluctuations that swing over life, there is a difference between life in the form that life in the extreme environment is more trapped around the mean and cannot diversify like life existing in a relaxed environment.

This can be seen in probability Table 1, which shows all 36 possible outcomes of rolling two dice, with winning outcomes in red and green and tie outcomes in grey. By merely looking at the table, one can see that if both dice are rolled out in the same medium at the same time, then the relaxed environment (1, 1, 1, 5, 5, 5) in the green area will be effected less in relation to the extreme environment (2, 2, 2, 2, 5, 5) in the red area. Thus, since it is the die with life in the extreme environment that is trapped around the mean and cannot diversify so well, this die has a greater probability of rolling higher. However, what is the exact probability that the extreme environment will have the high roll?

The expected outcomes of a single roll for the extreme environment are:

$$P_{Red} = \frac{18}{36} = \frac{1}{2} \quad (1)$$

The expected outcomes of a single roll for the relaxed environment are:

$$P_{Green} = \frac{12}{36} = \frac{1}{3} \quad (2)$$

Probability Table 1. Rolling two dice.

	2	2	2	2	5	5
1						
1						
1						
5						
5						
5						

Thus, as can be seen, the extreme environment will have the high roll, and the relaxed environment will be affected less in comparison. However, it is also noticed that the expected outcomes of a single roll can be:

$$P_{Grey} = \frac{6}{36} = \frac{1}{6} \quad (3)$$

This corresponds in terms of the game to the analogy of a tie. This means it does not get worse or better for life in any environment; it does not tip to any side.

However, what if one is to disregard the ties? Then one must forget what corresponds to the grey area in the table and re-roll both dice into the same medium at the same time until one of them comes out ahead. Since the dice keep re-rolling until one lands outside the grey area, the fraction of red or green in the table can be calculated without counting the grey outcomes.

The expected outcomes of a single roll for the extreme environment are thus:

$$P_{Red} = \frac{18}{12+18} = \frac{3}{5} \quad (4)$$

The expected outcomes of a single roll for the relaxed environment are thus:

$$P_{Green} = \frac{12}{12+18} = \frac{2}{5} \quad (5)$$

Thus, if one keeps on re-rolling ties, then the extreme environment (2, 2, 2, 2, 5, 5) die would have a $P_{Red} = \frac{3}{5}$ probability to roll higher.

Of course, each new re-roll is independent of the previous rolls, and as seen, each new roll does not necessarily come out in favour of the extreme environment. However, with many rolls, it will be seen that there is a greater probability that the extreme environment rolls higher than the relaxed environment, meaning that the lower variance and the increased stressors make the extreme environment more fixed over time than the relaxed environment.

These calculations represent a very simple picture of a very complex situation. It is statistics, dealing with probabilities rather than certainties. Thus, the probability differences between life in the example here are modest, and although life may be disadvantaged in the extreme environment, life in both environments could handle these fluctuations almost equally. Nevertheless, these differences may become prominent over a long period.

Thus, in an actual situation with fluctuations that oscillate back and forth over the environments, it could also be the case that for life in the extreme environment, a deterioration gradually occurs so that a die will roll even higher for it. Thus, this could become a self-sustaining effect, where life spirals downwards in an increasingly worse situation. It is not a given that life will disappear on an exoworld that remains at this stage with low biodiversity that thrives; these are very complex systems, but it is statistically a given that a greater biodiversity will ensure the survival of life better on an exoworld over time than low biodiversity will do.

4. Biovelocity Resistor

As discussed in section 3.1, the remaining species may be well adapted to the environment even if biodiversity decreases. When a microbial species is well adapted to an environment, and resources are available, it thrives and can exist in high cell density.

However, a species can also endure but not thrive optimally in an environment. So if the extremity in the environments increases even more than they did in the discussion in the previous sections, then one can have this scenario. Here, conditions such as temperature, pressure, pH, nutrients, or saline concentrations could become so extremely high or low that life can only endure here, meaning that both biodiversity will decrease and cell density will decrease (see Figure 1b). Thus, even if competing species are absent, resources may be plentiful, and a species is thus not kept in check by other species and resources, the cell density will be low anyway.

Here, a distinction is made between several extreme environments, where the next one becomes more extreme than the previous one. An environment can become more extreme than

the previous one by, e.g., temperature changes, but this can also happen by several factors, such as pH or saline concentrations changing in relation to each other.

Thus, many variables are at play here, but for the sake of discussion, the extreme environment in the previous sections will generically be designated environment δ while the increased extreme environment generically will be designated environment ϕ .

The cell density decrease in environment ϕ may be due to the organisms' reproduction going slower than it would otherwise do in environment δ . If the extreme environment here, e.g., is a temperature change, then it is well known that this is an essential determinant of the activity of microbial life. Thus, it is, e.g., found that *Thiobacillus ferrooxidans* at 18, 12, and 6°C yielded average generation times of 23, 44, and 103 hours, respectively, where the minimum temperature for growth was estimated not to be far from 0°C (Ferroni et al., 1986). So as extremity increases, otherwise rapidly reproducing organisms will find that their reproduction rate decreases.

There is a direct proportionality between the extremity of an environment increasing and the reproduction rate decreasing. Thus, in this scenario, there is an inverse proportionality between enduring an environment and the reproduction rate in that environment.

As a related note, the cell density decrease in environment ϕ , that their reproduction falls, can also be due to the organisms' metabolism going slower than it would otherwise do in environment δ . Thus, it is, e.g. found that *Geogemma barossii* 121 grew at temperatures between 85 °C and 121 °C, where it doubled in numbers after 24 hours at 121 °C. However, while growth could not be easily detected at higher temperatures, organisms incubated for up to 2 hours at 130 °C did grow when returned to 103 °C. Likewise, the organisms remained viable at temperatures below 85 °C but did not undergo cell division (Kashefi & Lovley, 2003). So as the extremity increases, otherwise fast metabolising organisms will find that their metabolism rate falls.

So there is a direct proportionality between the extremity of an environment increasing and the rate of metabolism decreasing. Thus, in this scenario, there is an inverse proportionality between enduring an environment and the rate of metabolism in that environment.

This can also be a definition of an extreme environment, namely that an extreme environment is one where organisms metabolise and reproduce more slowly than their progenitors did before they gradually adapted to this environment. However, this will only apply when the environment has become as extreme as environment ϕ , where life barely endures. Environment δ described in the previous sections will not necessarily have that effect on all organisms.

There is the following relation:

$$\begin{array}{l} \text{relaxed environment} < \text{extreme environment} \\ \rightarrow \\ \text{fast metabolism and reproduction} > \text{slow metabolism and reproduction} \end{array}$$

A boundary condition for life on such worlds is that the extremity acts as a 'resistor' on the velocity of metabolism and reproduction. Thus, a biovelocity resistor exists on inhabited worlds.

4.1. Variance and survival II

As mentioned in section 4, there is a direct proportionality between approaching an extreme environment and a decreasing metabolism and reproduction rate.

Thus, there is an inverse proportionality between enduring an environment and the metabolism and reproduction rate in that environment.

There are still only a limited number of species. However, by approaching the extreme environment, it is a trade-off to be able to live here with a low cell density, i.e. both the variance decrease and the cell density falls, see Figure 1b. This has costs, as the limitations that apply to biodiversity in section 3.2 will apply to an even greater extent here, as life will be even more vulnerable to environmental fluctuations and the effect of impacts than it was when only dealing with lower biodiversity.

For the macro events, two situations apply here.

The first is that an impactor, as discussed, can hit anywhere in a world, but it will necessarily only hit a specific place. Thus, only the organisms in the impact centre and the vicinity of the matter and energy deposit will perish. However, now, there is a more limited number of cellular individuals than before, and statistically a limited number of organisms will give a greater vulnerability to impacts simply because more organisms than a few have a greater opportunity to make it. Because here, life comes past the possibility of compensating through sheer numbers given by a high cell density.

The second is that an impact, as discussed, will also be able to change the atmosphere. In this situation, environment δ and environment ϕ will in fact be equal because, as discussed, the number of species ensures survival, not the number of cellular individuals. Thus, the number of species can still be the same in the two environments. Therefore, a particular species will still be able to respond well to the environmental changes an impactor will have globally.

However, many factors are involved, and given the lower number of cellular individuals, and given that they react more poorly to environmental stressors, then life in environment ϕ will be at a disadvantage to atmospheric changes long term, if not short term, than life in environment δ . So the macro-events discussed for environment δ will apply even more to environment ϕ .

For the micro-events, two situations apply here at the same time.

First, there are now a more limited number of cellular individuals. As fluctuations continue to swing back and forth in the environment, fewer cells can make it through alive than before, statistically lowering the overall survival chance.

Second, there are now a limited number of cellular individuals that do not thrive in their environment; they have a slower metabolism and reproduction and merely endure the environment. Thus, they react more poorly to these environmental stressors, and statistically they do not survive as effectively as before.

Thus, life is trapped around the mean on a Bell curve for real in this environment. For the decreasing biodiversity, this means that there could still be a limited fluctuation in species and genetic variation around the mean, but here the variation will be close to ceasing. So the statistical differences calculated between species in a relaxed environment and an extreme environment δ in section 3.2 will become even more profound here. The other environmental stressors may still be the same as with high biodiversity and thriving in the environment. However, as life is found in fewer numbers and reacts more poorly, the fluctuating fluctuations will have more severe effects.

In a physico-chemico here-and-now moment, such organisms can be considered successful because they survive and endure here and now. In an evolutionary perspective however, they cannot be considered as such; they represent a very fragile twig on a bush indeed. Thus, life in this more severe extreme environment ϕ may disappear relatively quickly compared to life in relaxed environments and the extreme environment δ . The micro events discussed for environment δ apply even more to environment ϕ .

The indirect biotic shield's ability to mitigate the effect of environmental events will be even worse off here than with the decreasing biodiversity, as life, to endure ever-increasing extreme environments, must move away from not only the backup of species that it can otherwise rely on to ensure long term survival but also the number of cellular individuals.

It is the case that a different scenario occurs with increasing extremity. If the extremity increases in a world, then the available area or volume increases from the perspective of life as the cell density decreases.

Thus, there is an inverse proportionality between area or volume and cell density.

This was already evident in the decreasing biodiversity. Thus, although, e.g. Antarctica possesses a large area, there is low biodiversity here. In contrast, islands with limited areas but with relaxed environments have virtually every available niche filled with diverse life.

However, this proportionality becomes even more evident for cellular density, although this is reversed in relation to low biodiversity. For biodiversity, there may be an area with decreasing biodiversity yet, as discussed, life can compensate by filling the area with a distribution of individuals from the same limited number of species. Thus, the same number of cellular individuals can be on both sides of the extreme arrow, see Figure 2.

For the cell density, there can be an ever-increasing area with a steadily decreasing number of cellular individuals from the same limited biodiversity. Thus, a vast extreme area can occur on a world, yet a modest number of cellular individuals will be present there.

Consequently, available resources can increase as cell density, and thus, competition in that area decreases.

Thus, a direct proportionality exists between extremity increasing and available resources increasing for remaining life.

Thus, short term, it may become easier for the remaining life to live as the competition disappears and the resources and the area can increase. However, life will be challenging in the long term, as it will still be more vulnerable to environmental fluctuations and environmental impacts.

In addition, species are specialised for their given environment, which means there is an inverse proportionality between environments and species. Indeed, the more different another environment is from the environment the organism comes from, the less possibility it has to survive in the other environment (von Hegner, 2020). So even if many species start to disappear, the remaining species will not necessarily be able to colonise the different environments, even if they increase in cell density in their own environment. Usually, new speciation will take place through the colonisation of new environments. However, as the extremity keeps the variants down, the cellular individuals will be trapped around the mean on a Bell curve and thus limited to the environments they are adapted to. However, as extremity increases, the environments will become more homogeneous, and the surviving species can colonise the other environments.

Thus, the situation differs from an Earth-like world. On extreme exoworlds, there may be large open areas, available resources and limited competition from other species and individuals from the same species, yet, the number of life will still be limited as life cannot utilise its environment as quickly and efficiently as if living in a relaxed environment. So seemingly counterintuitively, as the extreme environment increases in intensity, the available area and potential resources for the inherent life increase, but the ability of that life to exploit it decreases as their metabolism and reproduction slow.

Thus, the increasing extreme environment provides an inverse proportionality between the area and resources increasing and the possibility of survival decreasing.

Even though life eventually gets trapped around the mean on a Bell curve, specific options are still available.

One option that can be mentioned is that life which metabolises and reproduces more slowly can compensate by the unicellular organism evolving a longer lifespan as an individual than it would otherwise do.

Thus, there may be a direct proportionality between metabolising and reproducing more slowly and living longer.

Metabolising and reproducing more slowly is not necessarily an issue. However, the advantage of unicellular life is their rapid reproduction and high numbers, which allows them to adapt effectively to changing environments, an advantage lost here.

Some life can also enter dormancy in such extreme circumstances. However, the cell density also falls by doing so, and fewer members of a given species exist. So if the velocity of metabolism and reproduction is lowered, or if they periodically enter dormancy, the overall result is the same concerning the current situation.

Another option that can be mentioned is that an advantage life has, as the area increases and the density of cells decreases, is that life always increases entropy in its surrounding environment in the form of heat and waste products, i.e. life always makes its surrounding environment less favourable for itself (von Hegner, 2021). The more densely packed life is in an environment, the more impact this effect has. Thus, it is advantageous since there is more area but potentially the same resources. However, it may be inconsequential as life thrives on the Earth despite this universal limitation.

However, there will not come the point where life merely endures such an extreme environment and can no longer utilise the resources or reproduce itself. Quite trivially, the environment could eventually have increased so much in extremity that it is only a matter of physico-chemico conditions that life can no longer endure the increasing extreme environment, even if life has time to adapt. However, non-trivially, it can also disappear since, as discussed, environmental upheavals and impacts can eliminate the few remaining organisms, which there is a statistically more significant possibility of than with many species and organisms.

The increase in endurance and decrease in variance means an inverse proportionality exists between short-term and long-term survival on an extreme exoworld.

5. Variance of the worlds

Although nothing has been said about the number of inhabited worlds in a galaxy like the Milky Way, which may be at least 300 million potentially habitable worlds (Bryson et al., 2021), this does not change the fact that the given proportionality relations will still be applicable.

Thus, if inhabited worlds in a galaxy are considered as a population of worlds, and half of these turn out to be extreme worlds with decreased biodiversity, then, in light of the previous discussion, it will statistically be the case that many of these worlds, on average, will not do as well as relaxed worlds. Thus, relaxed worlds with a wide biodiversity will leave more surviving ecosystems over time, while the number of extreme exoworlds leaving surviving ecosystems will decrease on average.

So, just as members of a biological population have a differential fitness, and a selection of them over time will take place, members of a cluster of inhabited worlds can be said to have a differential habitability, where a selection of them over time will take place.

Of course, a prime difference is that differential fitness applies to the population of organisms interacting with the environment and each other. Some organisms have traits that

will be selected and fixed in the population over time. However, with differential habitability, the cluster of different worlds is subject to an unconditional probability, i.e. a probability that is unaffected by the preceding of other events, meaning that what happens to an inhabited world at one end of the galaxy does not affect an inhabited world at another end of the galaxy.

Nevertheless, it is still a statistical phenomenon that extreme exoworlds will do more poorly in terms of environmental impacts and environmental fluctuations than relaxed exoworlds.

Naturally, as for differential fitness, it also applies to differential habitability, that since this is a statistical phenomenon, this will only happen sometimes. After all, Earth-like relaxed worlds can still experience random environmental events that destroy their life. However, it is a statistical phenomenon that extreme exoworlds will leave fewer surviving ecosystems regarding environmental impacts and environmental fluctuations than relaxed exoworlds.

However, can relaxed worlds be the majority in a galaxy's history at any time compared to extreme worlds?

Nothing has been said qualitatively or quantitatively about how much biodiversity decreases in a world with increasing extremity or how long it may take to get there. An extreme world can thus still harbour many species, although these are limited compared to if the environment had been relaxed in that same world. However, the proportionality relations will still represent the situation regardless of whether something at present can be said about how much or how quickly these apply between worlds.

Thus, based on the abstracted proportionality relations, it will be possible to distinguish between inhabited worlds. The following classification of the variance of worlds can be established:

- Population I worlds; a world with no life.
- Population II worlds; a biodiversity-poor world.
- Population III worlds; a biodiversity-rich world.

This is more of an astrobiology classification than a planetary science classification, as these designations do not refer to the world's composition or stellar relationship, but are a variance of worlds regarding life, i.e. it refers only to the absence or presence of life. It also applies that they are generically called worlds, as they may be planets and other solar system bodies such as moons that may be abodes for life.

According to that classification, the Earth is currently a Population III world, while, e.g. Venus, if there indeed is life in its cloud layer (Haber, 1951; Greaves et al., 2021), is probably a Population II world.

For Population II worlds, as discussed, they can be biodiversity poor but still have a high cell density so that there can potentially be an equal number of cellular individuals on both sides of the extremity arrow. Thus, such worlds must be divided into environment δ or environment $\varnothing$, meaning there are Population II(b) and Population II(c) worlds as well.

Population II and Population III worlds will never at any time, if our current knowledge of solar systems is an indication, become the majority in comparison to Population I worlds. However, how they stand in relation to each other is more open.

Thus, there is interchangeability between these populations, as environmental factors change over time, and members of the populations can transform into each other.

All stars go through a life cycle, and the conditions for life on a world about any star will eventually decrease over time. Thus, e.g. the sun undergoes changes towards the red giant stage (Schröder & Connon Smith, 2008), and in line with these phases, the Earth's environment

will also become more extreme. Any Population III world will eventually be turned into a Population II world and then into a Population I world because of this.

In addition, environments on inhabited worlds are dynamic and fluent, and so are the response and effects of life on these environments. Thus, in addition to the fact that environments can change over time, life can also change the environments it exists in, even on a planetary scale. A prime example of this is the Great Oxidation Event (Cloud, 1968; Lyons et al., 2014), while another is that life brings a world's atmosphere out of thermodynamic equilibrium (Hitchcock & Lovelock, 1967).

So relaxed/extreme environments can be imposed externally by impact events or stellar change, but they can also arise internally from life itself. It is only in the relaxed environment and in environment δ that life can have an effective effect back on the environment. However, it is still true that there is a reciprocal relationship between life and the environment. Thus, members of the population can change into each other.

These are trivial facts. However, the question is more nontrivial, whether Population III worlds will become the majority at any given time in a galaxy's history with regards to Population II worlds. The answer to that depends on a distinction between a situation here and now and a situation over time.

So far, there has been discussion of Population II(b) and Population II(c) worlds that are biodiversity poor or have low cell density because they have obtained an overall extreme environment. Thus, life may have existed for a long time in such worlds.

However, Population II worlds can also be biodiversity poor or have low cell density because life has recently arisen in those worlds. Thus, there are also Population II(a) worlds that can have an overall relaxed environment but still limited biodiversity.

However, Population II(a) worlds represent a different situation than Population II(b) and Population II(c) worlds discussed so far.

In the first situation, one has that life arises and must spread against environments in a world. In contrast, in the second situation, one has a widely spread life that decreases due to increasingly extreme environments in a world. The issue here is that when life spreads in a world, the complexity of evolution also increases. However, conversely, when the extreme environment increases, the complexity of evolution also decreases. By this, it must be understood that many variables are at play in the interaction between life and environment in the first situation. In contrast, variables decrease in the interaction between life and environment in the second situation.

Thus, the extreme environment provides an inverse proportionality between 'complex' and 'simplified' evolution.

Thus, while overall biodiversity that decreases due to increasingly extreme environments will happen, it may not be given that rich biodiversity will spread against environments due to the situation's complexity.

A related issue is that a defining feature of life is that it is 'information explosive' (von Hegner, 2021), meaning that as soon as it arises, it will reproduce again and again and spread and eventually colonise every available niche in the world. As mentioned, it also applies that a boundary condition for life is that it can only arise in a relaxed environment. Thus, if a world has relaxed environments, then rich biodiversity will also in principle spread over the planet. It also applies that life from relaxed environments can adapt to entering and living in extreme environments. This appears to have been the initial situation for the Earth's life, as it may have arisen between 4.1 to 3.5 billion years ago (Bell et al., 2015), when many relaxed

environments gradually emerged, allowing rich biodiversity. Thus, the question is whether inhabited worlds generally achieve enough relaxed environments.

As discussed, the existence of a high number of cellular individuals on a world is not the same as rich biodiversity. Population II(a) worlds can be transformed into Population II(b) or Population II(c) worlds, but whether they can generally be transformed into Population III worlds depends on whether the worlds at any given time have sufficient relaxed environments for rich biodiversity to spread across the world. For the Earth, this was evidently the case, but whether this is statistically a general or special case cannot be said at this time.

That said, although Population II(a) worlds represent a different situation than Population II(b) and Population II(c) worlds, all Population II variants still have one thing in common, namely that biodiversity functions as an indirect biotic shield against incoming threats. Although Population II(a) worlds are young in terms of how long they have been inhabited, and Population II(b) and Population II(c) worlds are older in terms of life having existed on them for a long time, they could potentially possess equal amounts of life. Thus, as mentioned, an abundance of species spread over a large area will provide better protection against the impact itself and the effect it can subsequently have on the atmosphere.

This was discussed in the example of thermophiles, the oldest known life (Gaucher et al., 2010) because it was probably the only one that survived. In this case, the newly emerged life survived, but other worlds may not experience this. However, the question is how frequent and severe such impacts can be expected to be on inhabited worlds so that Population II(a) worlds will be prevented from making Population III worlds the majority at any given time. The frequency and severity may be low, but life may only arise in young worlds where the solar system is still turbulent with many impacts, making the frequency and severity high.

Thus, whether Population III worlds at any given time in a galaxy's history will succeed in becoming the majority in comparison to Population II worlds depends on a distinction between a situation here and now and a situation over time. Environments on inhabited worlds are dynamic and fluid; the environmental factors change over time, and so does life in response to these environments, represented by the proportionality relations discussed. So it may be a possibility that Population III worlds through Population II(a) worlds can achieve to be the majority in a here-and-now moment. However, it will still apply that Population II(b) and Population II(c) worlds over time will represent the majority of worlds, just as ultimately, Population I worlds represents the majority over time.

6. Conclusion

This work has carried out a high-level characterisation of the relationship between decreasing biodiversity and increasing extremity. Several isolated proportionality relations show what happens in any world with life as we know it. These relationships are inherently more qualitative than quantitative but are still relevant. They show that although extreme environments are no longer an obstacle in astrobiology, they are still of more limited value than what may be thought.

Thus, the fact that the environment is extreme implies a lower biodiversity and a lower biodiversity entails a greater vulnerability to potential environmental changes, global as well as local. Life faces issues because species' variance decreases and cellular individuals' metabolism and reproduction slow.

So extremophiles have gained importance by being able to live in extreme environments, providing possibilities for life on extreme exoworlds. Moreover, indeed, they can live in such environments, but here it is seen that a difference between them and mesophiles is that

mesophiles can exist as many species. In contrast, extremophiles, in comparison, can only exist as a few species, although the cellular number can be high. Thus, while extremophiles are considered robust, here is an example of a reduced possibility of getting through environmental upheavals compared to mesophiles. Interestingly, despite their name, an ecosystem made up only of extremophiles is more fragile than an ecosystem made up of mesophiles. Mesophiles possess a greater biodiversity and can survive better overall. This is a crucial point to keep in mind when searching for potentially inhabited exoworlds. All this does not mean that extremophiles have no value in astrobiology. It merely means that evolutionary and ecological constraints must be considered, not just life's physical and chemical capacity to survive here and now.

Thus, three boundary conditions for life on such worlds have been clarified. One is that life must necessarily arise in a relaxed environment, the next is that extremity acts as a 'resistor' on biodiversification, and the third is that an even higher extremity acts as a 'resistor' on biovelocity.

This is important, as there may be more inhabited worlds in the universe that can be considered extreme than inhabited worlds like the Earth.

That worlds exist in the habitable zone is no guarantee that they will not become solely possessing extreme environments. In fact, the habitable zone may be too restrictive, as the Goldilocks Edge has also been proposed (von Hegner, 2019), which may be the norm, thus increasing the number of extreme worlds even more.

Even though life has not yet been found on other worlds, these proportionality relations are essential because they allow us to evaluate the conditions for potential life elsewhere.

Venus was once a more relaxed planet, which due to a runaway greenhouse effect, became the inhospitable world it is today. However, if life once arose there and has gradually withdrawn into the cloud layer in step with the rising extremity and still exists in its atmosphere (Haber, 1951; Greaves et al., 2021), it very well applies that a once wide biodiversity has shrunk there now. The question is whether life thrives there or endures, i.e. is the environment conducive for the biodiversity resistor or the biovelocity resistor.

The same applies to Mars, which in the Noachian era was a more hospitable place than it is today (Fastook & Head, 2015; Carter et al., 2010). If life arose there, it might have eventually retreated to sublevel pockets, where it may still exist. The question here is just whether life thrives there or endures, i.e. is the environment conducive for the biodiversity resistor, or is it conducive for the biovelocity resistor.

On the Earth, these relationships mainly play a role at the beginning of the interconnected history between the planet and life and in the later phases of the planet's history. In the early phase of the origin of life, the Earth's environment was extreme, albeit with room for relaxed environments where life could arise. As the sun goes through the stages on its way to becoming a red giant, the Earth's environment will also become more extreme, and these relationships will become more prominent. Thus, in the Earth's middle life, these relationships are less prominent, as the Earth has a diversity of environments, relaxed and extreme, and life does very well indeed. However, in other worlds, the extreme environments may have remained prominent early on.

Evolution has a component of local necessity and a component of chance, and what path a species will take in interaction with an environment is not directly deducible from physical laws. Thus, evolution is more about retrodiction than prediction. The path taken by a species in an environment can be traced backwards with high certainty. However, what path it will take forward is not given, as environmental events are unpredictable and life can take different

paths concerning the same events. However, environment and life are here interconnected in such a way that the fact that the environment is extreme implies lower biodiversity and lower biodiversity means that life in an extreme world does it more poorly than life in a relaxed world, and thus statistically, the number of inhabited extreme worlds decrease compared to inhabited relaxed worlds.

The discussed proportionality relations represent an essential insight for astrobiology and the search for life on other worlds. The critical understanding is that although life such as extremophiles can live in extreme environments, and a given exoworld possesses abundant energy sources, resources and space, life may, seemingly paradoxically, have disappeared in such a world again precisely because of the extreme environment.

Of course, most species that have existed on the Earth have disappeared again. However, the difference is that speciation on the Earth continued to occur, while the possibility of speciation on an extreme world decreased due to the extreme environment. Thus, it is not sufficient to locate an extreme world with abundant energy sources, resources and space fitting for life as we know it.

The challenge is to assess the intensity of the extremity and the distribution and homogeneity of this in a world. If the presence of life is not evident, it may still be there, but it will require a careful assessment based on understanding the proportionality relations that have been abstracted in this work.

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All this is verily Brahman¹. A nondual account of the origins of the Universe.

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Abstract: In this paper the author presents a view on the so called “Pre Big Bang scenario” from the Consciousness Endomitosis Theory (CET), a metaphysical and cosmological model (Pulido-Moyano, 2021) integrating Vedantic philosophy with contemporary physics. Central to CET is the recursive sentence “I-AM-AWARE-that-I-am-aware,” which encodes a fractal, tetradic pattern of self-referential Consciousness manifesting within nested spherical structures or “cells”. These cells are the irreducible components of coagulated waves emanating from Brahman, and embody the iterative interplay of Beingness and Awareness. The fractal replication of this sentence within a cell culminates in a critical endomitotic limit, interpreted as the Big Bang. Post-Big Bang, the model identifies four fundamental forces corresponding to components of the recursive sentence, paralleling gravitational, electromagnetic, strong, and weak nuclear interactions. CET reconceptualizes entropy and black holes, viewing the pre-Big Bang fractalized cell as a state of minimal entropy and the universe’s evolution as a complexification process striving toward primordial equilibrium. Black holes serve as portals linking the finite universe to the infinite Brahman, encapsulating the cyclical nature of cosmogenesis. CET bridges spirituality and physics, proposing a unified vision where Consciousness is foundational to reality. This synthesis offers fresh insights into the ontological unity underlying existence, supporting a path toward liberation (moksha) through recognizing the inseparability of subject and object (science) and that of Brahman and Atman (Advaita Vedānta).

Keywords: Consciousness, Brahman, Big Bang, Advaita Vedānta.

¹ The phrase “All this is verily Brahman” comes from the Chāndogya, one of the principal Upanishads of the Vedic tradition. Specifically, it appears in verse 3.14.1: सर्वं खल्विदं ब्रह्म (“*Sarvam khalvidam Brahma*”). This verse is a foundational statement in Nondual (Advaita) Vedānta, emphasizing the oneness of the individual self (Atman) and the universal reality (Brahman).

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Introduction

In agreement with several scholars, I contend that modern cosmology has extended its scope beyond the boundaries typically considered strictly scientific. As Grujić (2002: 63) observed:

In a sense, modern cosmology turns out equally parascience at its outermost borders, as it was during the whole period of European culture development, from the archaic Greece, to the “Pre-Big-Bang” theoretical speculations today. There is nothing wrong with this, of course, as long as one is aware of these distinctions and does not proclaim speculative thought a scientific theory.

This article is, in many respects, a continuation of a previous work (Pulido-Moyano, 2021). In both texts, I acknowledge that my approach is speculative—indeed, metaphysical—rather than a scientific theory. Nevertheless, my inquiry is motivated by a deep conviction that science and spiritual traditions can mutually enrich one another. Some argue that scientific and spiritual knowledge pertain to fundamentally distinct domains, rendering genuine dialogue between them implausible. Others concede that, while partial overlap in subject matter may exist, methodological differences—sometimes viewed as irreconcilable—preclude any productive interaction.

I do not perceive this as a competition between science and spirituality over which best describes reality, nor do I subscribe to the view that reality is partitioned into distinct levels accessible exclusively to either science or spirituality. Rather, I maintain that reality is singular—an indivisible whole comprising all that exists. Indeed, nothing exists outside of reality (outside of Brahman or Consciousness, as will be elaborated later); strictly speaking, there is no unreal entity. As articulated in the Vedantic tradition, Reality (Brahman / Consciousness) is the *One without a Second* (*ekam eva advitiyam*).

A growing number of scholars are seeking “to integrate Advaita Vedānta with contemporary developments in quantum physics. Among them, Leong (2025) stands out for his innovative articulation of this synthesis. Leong situates Vedantic non-duality within the context of quantum science and consciousness studies, proposing that his contribution...

... offers a coherent transdisciplinary framework that transcends the limitations of both classical metaphysics and empirical reductionism. It enriches the academic discourse on the nature of consciousness and provides a philosophical foundation for lived transformation—where the realization that “Thou art That” becomes not merely a metaphysical proposition but a verifiable, experiential truth (4).

All description necessarily involves language. Language, of course, is itself a part of Reality—unique in that it represents Reality’s attempt to reflect upon itself through a semblance of distance. Among its many functions, language gives shape to our existential concerns: What is Reality? What is the origin of the universe? Does human existence have purpose? Human beings often assume that language and thought are indispensable to understanding. As a civilization, we have placed great hope in the idea that more precise language and more refined thought yield deeper insight. This has given rise to countless scientific theories. Yet, these theories remain ultimately constructs, that is, elaborate assemblies of words and concepts endowed with explanatory power. We must also ponder the famous saying of the

Third Ch'an Patriarch Seng-ts'an: "*The more words and thoughts, the more you will go astray. Stop speaking, stop thinking, and there is nothing you cannot understand.*"

Is it true that excessive language and thought lead us astray? Frequently, yes. Conversely, can we truly understand if we cease both speech and thought? If this "cessation" refers to the mental state known in certain Asian spiritual traditions as *nirvikalpa samadhi*, then my answer is an emphatic yes. This answer is not speculative or intuitive, but grounded in direct spiritual experience. Nevertheless, I feel a responsibility to employ language -albeit cautiously- as a means of pointing toward truth and potentially guiding others toward the same certainty that countless individuals throughout history have also realized.

In this article, I offer a theoretical proposal -yes, more words!- that aims to foster reciprocal enrichment between science and spirituality. I argue that our civilization needs a science informed by spiritual insight, and a spirituality informed by scientific rigor. The article builds upon a metaphysical cosmological framework introduced previously, known as *Consciousness Endomitoses Theory (CET)*. As I stated in that earlier work (Pulido-Moyano, 2021: 98), "Consciousness does not 'emerge' from anything, because it is the very ground from which everything emerges. Consciousness is not a property, but the unique substance of which all existing physical properties are modulations". "Physics explain phenomena, but Consciousness is not a phenomenon; instead all else are in Consciousness" (Goswami, 1995: 215). This view aligns with David Leong's (2025) recent definition of Consciousness as ...

"... a self-existent, nonlocal field, ontologically primary and irreducible to material substrates. Within this non-dual framework, *Atman* is conceptualized as a fractal instantiation of *Brahman*, the undivided totality and highest symmetry of being" (2025: 1).

In section 3, we will see a metaphysical description of the ultimate, irreducible substrate of what we call Reality, a substrate that may be referred to interchangeably as Consciousness or Brahman. Though inherently indescribable, this substrate can be approached metaphorically through terms such as "vibration," "wave," "coagulation," or "cell." Even "substrate" is metaphorical, as is the term *Brahman*.

The theory developed here revolves around a central concept: *equilibrium*. I maintain that all phenomena-events, processes, dynamics, and patterns-can be understood as either ruptures of equilibrium or movements toward its restoration. The metaphysical account of a pre-Big Bang scenario developed herein represents a deepened version of *CET*, now also referred to as *Brahman Endomitoses Theory*. This updated version emphasizes its radical ontological monism: Reality is not composite but consists of a single, indivisible substance: Brahman.

As I will say in the conclusions, if *CET* has any central advantage at all, it would be that of stimulating our spiritual liberation or *moksha*. And, if *CET* has any other advantage, it would be that of beauty, which reminds me of Alexander Vilenkin (1982), who proposed a cosmological model in which the universe is created by quantum tunneling from literally nothing into a de Sitter space. After the tunneling, the model evolves along the lines of the inflationary scenario. The advantages of this scenario were, according to Vilenkin, "of aesthetic nature":

It gives a cosmological model which does not have a singularity at the big bang (there still may be a final singularity) and does not require any initial or boundary conditions. The structure and evolution of the universe(s) are totally determined by the laws of physics. (27-28)

In Section 1, I will introduce the longstanding problem of the singularity known as the Big Bang, along with some contemporary challenges posed by alternative “pre-Big Bang” scenarios. Brief attention will be given to insights from string theory (1.1), Roger Penrose’s *Conformal Cyclic Cosmology* (1.2), views on fractals and the Universe (1.3), and Antonios Valamontes’s *Coherence Cosmology* (1.4). Section 2 explores the spiritual tradition of *Advaita Vedānta*, which I argue provides the most coherent dialogue partner for contemporary cosmological inquiry. This will serve as a prologue to Section 3, where I present the central arguments of *CET* and its account of a pre-Big Bang metaphysical model. The article concludes by comparing *CET*’s cosmological views with those of Penrose, Valamontes, and Everett, and by reflecting on the urgent need to bridge scientific and spiritual ways of knowing.

1. The Big Bang singularity and the pre-Big Bang scenario

In 1927, priest and astronomer Georges Lemaître proposed an interpretation of Einstein’s general relativity equations suggesting that the universe is expanding from an initial singularity, which he described as a “primeval atom” or “cosmic egg.” According to this model, the subsequent expansion gave rise to space, time, matter, and energy. In the 1940s, George Gamow and his collaborators further developed this framework by predicting the existence of cosmic microwave background radiation—an observable remnant or “echo” of the initial expansion (Alpher & Herman, 1948).

The term “Big Bang” was coined by Fred Hoyle in 1949 during a BBC radio broadcast. It soon gained widespread acceptance, particularly after the empirical discovery of the cosmic microwave background radiation by Penzias and Wilson in 1965, which provided strong support for Gamow’s predictions (Penzias & Wilson, 1965).

Over the past seven decades, the Big Bang theory has emerged as the dominant scientific explanation for the origin of the universe. Nevertheless, it poses conceptual challenges. In his accurate summary of the aspects of the Big Bang theory that remain unexplained or are under investigation. As a scientific model, it implies the emergence of the universe from a singularity, often interpreted philosophically or metaphysically as “nothingness”, which appears to conflict with the scientific principle of causality. Bazaluk (2016) articulated this paradox, noting the difficulty in reconciling the emergence of everything from non-existence or absolute nothingness (p. 14):

In the Standard Model, there is no clear answer about the causes of evolution. There is a general understanding of the “Big Bang”, “inflation”, “point singularity”, actions of the definite laws, fundamental constants, etc. However, all these “scraps” of knowledge and assumptions only postulate and allow for a definite amount of meanings which are often presented as “the absolute truth”. None of the existing cosmological models is able to articulate and justify the greatest factors and causes of the evolution of the Universe at the scale of Cosmology.

Astronomer David Darling (1996) articulates this issue clearly, noting that the notion of the universe emerging from nothing challenges fundamental scientific reasoning:

What is a big deal is how you got something out of nothing. Don’t let the cosmologists try to kid you on this one. They have not got a clue either... “In the beginning,” they will say, “there was nothing—no time, space, matter, or energy. Then there was a quantum flutter from which...” Whoa!

Stop right there... First there was nothing, then there was something. And the cosmologists try to bridge the two with a quantum flutter, a tremor of uncertainty that sparks it all... and before you know it, they have pulled a hundred billion galaxies out of their quantum hats... You cannot fudge this by appealing to quantum mechanics. Either there is nothing to begin with, no pre-geometric dust, no time in which anything can happen, no physical laws that can effect change from nothingness to somethingness, or there is something, in which case that needs explaining (as cited in Boyer, 2009: 49).

In his illuminating book *The Spirit of Spinoza*, Grossman (2014) emphasizes that the principle of sufficient reason posits that there must be a cause or reason for everything that occurs. Accordingly, if the Big Bang constitutes an event, it necessarily requires a cause or explanation. However, as Grossman notes, this cause cannot reside *within* time or space, since both time and space themselves came into existence with the Big Bang. The implication is that any adequate explanation for the origin of the universe must transcend spatiotemporal frameworks:

Therefore, the cause of the big bang must be something that exists outside of time. If we agree to use the word “eternal” to refer to anything that exists outside of time (and this is Spinoza’s usage) it is clear that the entire physical universe as we experience it—the world of things in space and time—depends for its existence on causes that are eternal. Furthermore, since the cause of the big bang is eternal, i.e. it is not a temporal process that begins to exist or ceases to exist in time, it follows that this cause exists “now,” and not only at the moment, so to speak, of the big bang. Therefore, the spatio-temporal universe must be continuously emanating from its eternal cause.

As stated by Chopra & Kafatos (2017: 31):

One thing is certain, however: the origin of space and time didn’t happen in space and time. It happened somewhere extraordinary, which, luckily for us, means that extraordinary answers aren’t out of place—they are demanded. With that in mind, let the cosmic riddling begin.

I will return to Grossman’s insights in the conclusion of this article. Notably, he is not alone in proposing the necessity of something existing outside or beyond the Big Bang. Bazaluk (2016) observes that many contemporary cosmologists have increasingly adopted the view that the Big Bang does not represent the *First Principle* or absolute beginning, but rather “the intermediate stage of evolution: the transition from one state of substance and field to another” (p. 15). From the standpoint of foundational scientific reasoning, it seems unavoidable to posit the existence of some prior or transcendent reality—something that preceded or caused the Big Bang and that accounts for the emergence of space, time, matter, and energy.

The purpose of this article is to propose a metaphysical explanation for such a reality. This explanation is rooted in the non-dual philosophical tradition of Advaita Vedānta and is developed through conceptual reasoning rather than empirical investigation or mathematical modeling. Consequently, it does not meet the criteria for a scientific explanation in the conventional sense, but rather constitutes a metaphysical hypothesis grounded in philosophical reflection. In any case, I am searching a “transdisciplinary synthesis, wherein

ancient metaphysical traditions such as Vedānta are not treated as cultural artefacts or mere spirituality but as rigorous phenomenologies and ontologies that anticipate and complement modern science. In their language, both traditions affirm that reality is nonseparable, relational, and consciousness-dependent. The observer does not simply uncover what is-but co-arises with it in a dance of participation” (Leong, 2025, 9).

The concept of a pre-Big Bang scenario has become central to many cosmological discussions in recent decades. I concur with Gonzalez-Mestres (2014), who acknowledges that if so-called standard elementary particles are not truly elementary, and if a pre-Big Bang era preceded and influenced the evolution of the universe as described by standard cosmology, then “our knowledge of particle physics and cosmology remains by now preliminary and possibly far from the actual fundamental laws” (p. 9). The present article aims to explore an alternative, metaphysical approach to the pre-Big Bang scenario. I contend that proposing a metaphysical theory is legitimate when the context under investigation -namely, the pre-Big Bang scenario- is situated beyond the scope of empirical science and outside any conceivable space-time framework.

I also find resonance with Bojowald’s (2008) observation that it is striking to see serious scientific discourse about a universe existing before the Big Bang within various approaches to quantum gravity. The very idea that such a discussion is now entertained in theoretical physics reflects a significant shift in how foundational cosmological questions are framed:

[It is surprising to see] not just statements about the possibility of the Universe having existed before the big bang, which could, in principle, be inferred from a general analysis of equations of motion, but even assumptions on its classicality or claims about the form of its state such as its fluctuations at those times are put forward. Even if this may be possible theoretically, it raises the question of how much one can really learn about about a pre-Big Bang universe from observations (p. 2135).

Gasparini (2022) offered a compelling analogy-explicitly described as lacking scientific validity, yet nonetheless philosophically suggestive, between the Big Bang and the moment of childbirth. As he explains, “The Big Bang [...] marks the beginning of our Universe in the same way as childbirth marks the beginning of a new human life” (p. 19). While the analogy does not serve as a scientific model, it highlights the distinction between an observable beginning and the complex, often inaccessible processes that precede it. Just as childbirth signals the start of a new life but not the beginning of biological development, the Big Bang may represent a threshold rather than an absolute origin:

Childbirth, however, is not a sudden and spontaneous event: it is prepared by a long period (nine months) of pregnancy. In the same way, we may expect that the big bang epoch, also, should be prepared, in some way. String cosmology suggests that it might be prepared by a long epoch of pre-big bang evolution at growing curvature, growing density, growing coupling, preceding the final ‘delivering’ explosion (id.).

From a rational standpoint, it is reasonable to argue that the Big Bang must have been preceded or caused by something, as it is difficult to accept that it could have emerged from absolute nothingness. The plausibility of a pre-Big Bang scenario aligns with both common sense and fundamental philosophical reasoning. Moreover, certain claims within theoretical physics -particularly within string theory- may appear conceptually problematic.

For instance, notions such as “growing curvature” or “growing density” are difficult to reconcile with a state in which neither space nor matter has yet emerged. It is legitimate to question what such terms could meaningfully refer to in the absence of any spatiotemporal framework.

Khalid’s (2025) recent proposal seems to make the same mistake of proposing elements of a pre-Big Bang scenario whose definition implies a space-time framework arising from the Big Bang, making the proposal absurd. This author suggests that before the Big Bang, the universe was governed by an informational framework where mass, entropy, and velocity determined the stability of systems, and that the subsequent collapse of this framework triggered the explosive expansion of the Big Bang. While the concept of entropy may escape a narrow definition in purely thermodynamic terms, it is clear that speaking of mass, space-time, and a relationship between these two (velocity) presupposes a post-Big Bang context.

Some researchers have gone so far as to suggest the possibility of *observable* pre-Big Bang phenomena. Gasperini (2016), for example, discusses the theoretical detection of gravitational waves that may have originated in a pre-Big Bang epoch. Yet this raises a fundamental conceptual issue: how can we observe phenomena from a domain in which time, space, matter, and energy -as understood within our current scientific paradigms- do not exist? This paradox may stem from ambiguity in the use of the term *observation*, especially when applied beyond the empirically accessible universe. This issue is at the core of a recent article by Verstraeten & Verstraeten (2025: 62):

What about realism of the spacetime of entities beyond the domain of observable events? Does the creation of space and time also exist beyond the borders of the past and future light cone? The actual “now” and “here” observe only events within the past light cone and it can only influence events within the future light cone. Insofar as events within the light cone are influenced by phenomena from without, realism extends the horizon of events. The cosmological horizon of de Sitter space is the absolute metaphysical border of spacetime of entities. Spacetime of events, however, is a thing limited by the a priori terms of observability of extrinsic characteristics of events. Metaphysical claims beyond this “thing” are pure speculation and deny the epistemological terms of realism. Furthermore, the supersubstantialism approach of Whitehead’s concepts of Nature puts even more restrictions on possible speculations and ontological claims. Indeed, as extension and duration appear after baryonic creation and the gravity-memory reaction of space and time, claims about what precedes and what is happening after space and time destruction are out of the question. Before and afterwards, there is no ‘thing’ and in consequence metaphysically there exists nothing in the scope of Whitehead’s super-substantialism.

Feinstein, Kunze, & Vazquez-Mozo (2000) proposed a model within the pre-Big Bang framework in which the universe emerges from a bath of plane gravitational and dilatonic waves. According to their scenario, these waves interact gravitationally, breaking the initial exact plane symmetry and generically leading to gravitational collapse that culminates in a singularity characterized by a Kasner-like structure. As they explain, “the idea is to start with strictly plane waves moving in different directions which interact gravitationally at some stage to produce a space-time singularity” (p. 15). This raises a fundamental conceptual

challenge: what could the notion of “different directions” signify in a context where space itself has not yet emerged?

1.1. A few remarks on string theory and the pre-Big bang scenario

I concur with Mamedov (2025) that exploring what might have existed before the Big Bang is challenging because our current understanding of physics breaks down at the singularity. This author reminds us that several hypotheses and speculative ideas have been proposed regarding what might have existed or what might have triggered the Big Bang (2025, 48):

Multiverse Theories: Some theories propose that our universe is just one of many within a larger multiverse. These multiverse models suggest that other universes might exist alongside ours, each with its physical laws and properties. Quantum Fluctuations: Certain hypotheses in quantum physics suggest that the Big Bang might have resulted from quantum fluctuations in a preexisting state. These fluctuations could have triggered the rapid expansion that led to our observable universe. Eternal Inflation: According to this concept, the universe might have undergone cycles of expansion and contraction before our observable Big Bang, possibly through an eternal process. String Theory and Brane Cosmology: String theory and related ideas propose extra dimensions beyond our familiar three-dimensional space and one-dimensional time. Some theories within this framework suggest that collisions between higher-dimensional objects (branes) might have led to the Big Bang. However, it is crucial to emphasize that these ideas remain largely speculative and are currently difficult to test empirically.

String theory has played a significant role in inspiring theoretical physicists regarding the potential for a quantum theory that unifies general relativity with quantum mechanics (Polchinski et al., 1998; Zwiebach, 2009). Nevertheless, the investigation of the initial singularity problem and the exploration of possible alternatives-offered by string theory and other quantum gravity frameworks-remain as relevant as ever (Bozza, 2022).

It is widely accepted that the Big Bang singularity arises from extrapolating general relativity beyond its domain of validity (Rovelli, 2004). Specifically, general relativity ceases to provide reliable descriptions of time as the universe approaches the initial singularity. During the extremely brief interval between the initial instant of the Big Bang and the Planck time (approximately 10^{-43} seconds), Einstein’s field equations lose their predictive power. Similarly, the laws of general relativity break down with respect to space as the curvature radius of the universe approaches the Planck length, at which point quantum effects are expected to dominate the structure of space-time (Amelino-Camelia, 2013). Bazaluk (2016) emphasizes that knowledge about the Planck epoch remains extremely limited:

At the Planck stage, regarding energy (10^{19} billion EV), it is supposed that gravitational interaction was as strong as numerous other forces. As a consequence, four interactions of the Universe were apparently combined into one single “super” force. Perhaps our Universe had existed in a perfect state of “nothingness” or in empty space with a multitude of dimensions. That mysterious symmetry which mixed all four interactions, leaving equations unchanged is most likely “supersymmetry”. Due to unknown reasons, this symmetry, having combined all four interactions, was broken and a tiny

bubble was formed, the embryo of our Universe that possibly arose as the result of considerable, but random fluctuations (p.49).

Klein & Reschke (2018) discuss how the Big Bang singularity in general relativistic cosmologies can be examined from multiple perspectives. Within various quantum gravity theories, the singularity may be resolved or eliminated, with the Big Bang potentially preceded by a “big crunch” or emerging through alternative scenarios (Ashtekar, 2009; Banerjee, Calcagni, & Martín-Benito, 2012; Kawai et al., 2006; Gasperini & Veneziano, 2003; Khoury et al., 2002). Additionally, some studies propose that dimensional reduction is a fundamental feature of quantum gravity, wherein the effective dimension of spacetime points at sufficiently small scales decreasing to $d = 2$ (Carlip, 2015; Stoica, 2014).

The geometry near the singularity and possible pre-Big Bang models have also been approached from classical perspectives. Penrose and other researchers, as will be discussed later, have explored these issues using conformal geometric methods (Penrose, 2006, 2010; Tod, 2003; Friedrich, 2015; Stoica, 2016). Furthermore, the dynamics near and through the Big Bang have been investigated (Xue, 2014).

Experimental observations such as redshift measurements and the Cosmic Microwave Background (CMB) radiation support the conclusion that tracing back in cosmic history leads to phases of progressively higher temperature, energy density, and curvature. However, “as we arrive close to the singularity, classical equations are known to break down” (Veneziano, 1998: 1). As Ashtekar (2006) explains:

Except very near the Big Bang, equations of general relativity provide an excellent approximation to the more fundamental ones. However, the approximation breaks down completely near the Big Bang, when the density ρ of matter approaches the Planck density $\rho_{\text{pl}} = c^3/8\pi G\hbar \sim 10^{94}\text{gm/cc}$. In quantum geometry, space-time curvature does become very large in this Planck regime, but not infinite. Very surprisingly, quantum geometry effects give rise to a new repulsive force, which is so strong that it overwhelms the usual gravitational attraction. General relativity breaks down.

It is generally supposed that phenomena occurring at the Planck scale fall under the domain of an as-yet-unknown quantum theory of gravity. However, this remains speculative, as any quantum gravity effects at the Planck scale -and indeed the very existence of the initial singularity- are beyond current observational access (Vilenkin, 1983; Linde, 1984). The standard cosmological model does not address the problem of the initial singularity. To bridge this “explanatory gap,” Veneziano and collaborators developed a “stringy” cosmology based primarily on a property of the low-energy effective action known as scale-factor duality (Borunda & Ruiz-Altaba, 1998). Veneziano (1998) argued that time did not begin with the Big Bang; rather, some pre-Big Bang physics “cooked up” a “good” Big Bang from a more generic, less fine-tuned initial state. This perspective defines the so-called pre-Big Bang scenario.

Veneziano was among the most prominent researchers who believed that string theory could provide insights into how a pre-Big Bang scenario caused the Big Bang. However, as Vyas & Joshi (2017) acknowledge, these questions are “extremely debatable and cannot be answered clearly” because envisioning conditions before the Big Bang requires looking beyond the Planck scale, which, as noted, remains inaccessible to observation. These authors further contend that string theory cannot fully address certain questions about the pre-Big

Bang era and suggest that “perhaps one can look from the metaphysics point of view also” (p. 196).

Durrer, Kunze, & Sakellariadou (2002) argue that the pre-Big Bang scenario should not be regarded as an alternative to the conventional standard cosmological model with inflation but rather as a complement to it. According to them, full string theory predicts that the pre-Big Bang solution would be “expected to be smoothly connected to a standard post-Big-Bang universe whose evolution is described by general relativity” (p. 661). Nevertheless, recent studies challenge the feasibility of such a “smooth connection.” For example, Tan, Wu, & Liu (2024), after conducting a comprehensive analysis of the pre-Big Bang cosmological scenario as a potential explanation for the PTA signal detected in the NANOGrav 15-year dataset, reported several significant findings that pose fundamental challenges to the pre-Big Bang interpretation of the data. These results carry important implications for string cosmology and early universe physics, suggesting that “either significant modifications to the current PBB [Pre-Big Bang] framework are necessary, or alternative theoretical approaches should be pursued to explain the NANOGrav observations” (p. 4).

Despite these developments, many physicists remain skeptical of string theory as a viable candidate for a “Theory of Everything,” with some regarding it as fundamentally flawed in its assumptions. Notably, Roger Penrose, whom we will discuss in the following section, exemplifies such criticism. Hedrich (2005), for instance, contends that “string theory is no theory at all” due to its lack of empirical testability and conceptual coherence:

[String theory is] rather a labyrinthine structure of mathematical procedures and intuitions which get their justification from the fact that they, at least formally, reproduce general relativity and the standard model of elementary particle physics as low energy approximations. (...) Even if all relevant implications for all string scenarios could be derived, string theory would, on principle, be a theory which can not be falsified. String theory would remain metaphysics, without any hope to become a physical theory” (p. 17).

1.2. Penrose’s *Conformal Cyclic Cosmology*

As previously noted, Penrose is among the scientists who reject string theory as a viable framework. Inspired by Penrose’s *Conformal Cyclic Cosmology* (CCC), Nelson & Wilson-Ewing (2011: 1) proposed the existence of a “classical” universe, characterized by a spacetime manifold populated by energy and matter, within the pre-Big Bang scenario.

Powerful events in the pre-big-bang epoch such as supermassive black hole collisions could have produced pulses of gravitational waves which would then propagate to the current post-big-bang epoch of our universe and intersect the observed CMB sphere where these pulses would leave imprints appearing as circles to observers. More specifically, if a cosmological model allows a pre-big bang epoch during which the universe is large and classical, it could be populated by galaxies, stars and black holes just as it is today and, in particular, it would be possible for collisions between supermassive black holes to occur.

Just as it is today! The pre-Big Bang scenario appears strikingly similar to the post-Big Bang phase, suggesting that the singularity may function merely as a transitional interface between two qualitatively analogous universes. This cyclic framework aligns with the core premise of Penrose’s CCC, which posits that the universe evolves through a succession of expansive epochs, or “cosmic aeons”, as Penrose describes them. Each aeon begins

with its own Big Bang and eventually evolves into an asymptotically de Sitter-like state characterized by indefinite, exponential expansion. As Meissner & Penrose (2025) noted in a recent study:

The future conformal infinity of each aeon is thus a spacelike 3-surface, and the aeon is taken to continue, as a conformal-structured space-time, to become the conformally stretched big bang of a subsequent aeon. In the CCC scheme, this succession is considered to continue indefinitely in both temporal directions. It is also assumed that each of these aeons is qualitatively similar, in overall features, to each other aeon, all of them expanding, so none actually contracts (p.1).

According to the authors, compelling observational support for the CCC framework is presented in Meissner, Nurowski, & Penrose (2020), with additional reinforcement provided by Meissner & Nurowski (2018) and by Gurzadyan and Penrose (2013). In their paper *CCC and the Fermi Paradox*, Gurzadyan & Penrose (2015) proposed that within the structure of CCC, information transfer between cosmic aeons is, in principle, possible. Consequently, the so-called “Fermi paradox” and the SETI program-traditionally concerned with interstellar communication-may be reconsidered from a novel perspective: such information could, theoretically, be encoded in the cosmic microwave background (CMB).

The description provided by Meissner & Penrose offers not merely a geometrical representation of the CCC model but also, according to the authors, a plausible depiction of the physical reality of our universe. They argue that the CCC model attains physical viability because “at both the past and future ends of each aeon, the physics is dominated by conformally invariant physical contributions so that the transition from aeon to aeon can make physical sense through a conformally invariant (scale-free) basic limiting physics” (Meissner & Penrose, 2025: 1). This argument resonates with Verstraeten & Verstraeten’s (2025) conceptualization of a “giant Carnot engine” as a metaphor for the universe’s eternal thermodynamic cycle.

Initially, Penrose conceived of the conformal “space-time” preceding the Big Bang as a purely mathematical construct-introduced solely to formulate, in a mathematically elegant manner, what he termed the *Weyl Curvature Hypothesis*. This hypothesis pertains to the geometric characterization of gravitational entropy within the framework of general relativity. However, in a notable shift, Penrose later advanced what he himself called an “outrageous proposal” (2005): that this conformal structure prior to the Big Bang should be taken not merely as a mathematical fiction, but as something with genuine physical reality. Naturally, this led Penrose to pose a foundational question: what form of “physical reality” can coherently be attributed to a space-time that precedes the Big Bang?

CCC posits that what we currently perceive as the complete history of our universe constitutes merely one aeon within an infinite sequence of similar aeons. In this framework, the infinite future of each aeon is conformally matched to the Big Bang of the next via an infinite rescaling of spacetime. Penrose argues that, in the far future, as the universe continues to expand and all matter ultimately disintegrates (e.g., through black hole evaporation), the concept of scale loses physical significance. This renders a conformal mapping between the final state of one aeon and the initial state of the next both mathematically feasible and physically meaningful. As such, CCC eliminates the notion of an initial singularity: rather than a classical Big Bang, the model describes a smooth, scale-free transition from one aeon to the next (see Figure 1).

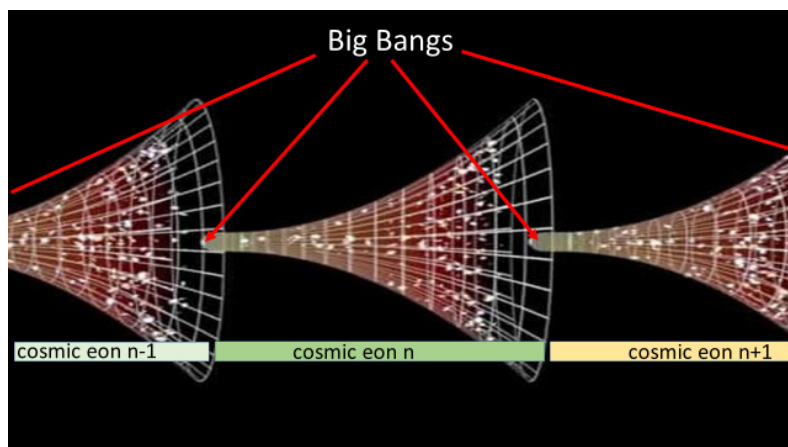


Figure 1. *Conformal Cyclic Cosmology* as seen by Penrose.

In the asymptotic future of each aeon, all massive matter is expected to vanish—primarily via black hole evaporation—leaving behind a radiation-dominated universe. Since radiation (e.g., photons) lacks an intrinsic mass scale, it permits the conformal continuity required for the transition to a subsequent aeon. Penrose and collaborators have claimed to identify empirical signatures of *CCC* in the cosmic microwave background (CMB), specifically in the form of concentric circular patterns known as “Hawking points.” Aside from suggesting that Hawking’s points could be reminiscences of the past aeon, *CCC* makes no strong claims about the imprint that previous aeons may have left on the current aeon, at least not as explicit as *CET* does:

But holons have something else apart from four structural components: they have a ‘history’. Any holon carries within itself a record of the path followed in resolving the tension between what we called the ‘original being-awareness unlimited nature’ and the ‘acquired space-time limited condition’. (...) *CET* holds that the behavior of any holon is aimed at resolving this ontological tension, which basically consists of restoring a state of equilibrium. In other words, any holon carries within itself a “biographical” record of the vicissitudes it has been through ... [and] these records do not disappear after the holon has been engulfed by a black hole (Pulido-Moyano, 2021: 110).

Chopra & Kafatos (2017: 42) also defend a cyclic cosmology with “memory”:

One Big bang leads to another in an endless cycle, and so the pre-created state is just the tail end of the previous universe. The sequence of creations retains a certain kind of memory from one cycle to the next.

In their 2025 study, Penrose and Meissner established a theorem, employing twistor theory, which demonstrates the existence of an invariant quantity in *CCC*. This invariant enables a direct relationship between the energy density of the previous aeon (pre-Big Bang) and the energy density of the current aeon (our universe), mediated by the conformal transformation.

Using this invariant it is shown that, surprisingly, there is a quantitative agreement between the masses of the black holes from the largest galaxy

clusters (approximately 10^{15} solar masses) in the previous aeon and the raise of the temperature in the Hawking spots on the CMB map of the next aeon coming from the evaporation of these black holes. This agreement suggests that physics in the previous aeon was either identical or similar to the one we have in our aeon, at least in the gravitational sector. The scenario is proposed where the gravitational waves constitute the main ingredient of very late Universe, a Gravitational Wave Epoch with large local fluctuations of the Weyl tensor in presence of the cosmological constant, followed by a crossover and the continuation of the GWE at the beginning of the next aeon. (pp.18-19)

1.3. Some remarks on the fractal structure of the universe

Penrose's cosmological proposal is grounded in the conformal symmetry of spacetime, wherein angular relationships are preserved despite variations in scale. That is, one may stretch, compress, or otherwise distort spacetime, yet the local angular relations between vectors or geodesics remain invariant. This principle is intimately connected to the broader notion of scale invariance, a symmetry under which the physical laws remain unchanged when lengths are rescaled globally. As will become evident, our *CET* draws upon this idea to articulate a radically recursive ontology: the iterative structure of Consciousness, expressed in the recursive sentence "I am aware that I am aware", is posited as a fractal pattern intrinsic to the very fabric of the cosmos. (Section 3.7 describes in detail the structure of this recursive sentence.)

In this context, it becomes essential to address the role and limitations of fractal geometry in observational cosmology, particularly with respect to large-scale structure and self-similarity across cosmic epochs. While fractal concepts have precedent in cosmology, these have traditionally referred to analyses of the spatial distributions, patterns, or morphologies of matter within the observable post-Big Bang universe. The novelty of *CET* lies in its ambitious attempt to apply fractal theory to characterize a pre-Big Bang scenario. Specifically, *CET* proposes to model the process of endomitosis occurring in Brahman as a fractal phenomenon.

In this respect, I align with Leong (2025), who defines Consciousness as "a self-existent, nonlocal field-ontologically primary and irreducible to material substrates," and further conceptualizes Atman within a non-dual framework as "a fractal instantiation of Brahman, the undivided totality and highest symmetry of being" (p. 1). Dickau (2009) highlights that fractals or fractality appear across cosmology's scale extremes—from the infinitesimal Planck scale to the ultimate cosmic scale—and at intermediate scales as well. He notes that theoretical frameworks such as *Causal Dynamical Triangulation* and *Quantum Einstein Gravity* reveal fractal properties of spacetime at the ultra-small Planckian regime, suggesting that the dimensionality of space evolves temporally or depends on observational resolution. Dickau observes that while fractals have become a subject of serious inquiry within mainstream cosmology, the fractal metaphor has also been appropriated outside scientific orthodoxy. Thus, some varieties of fractal cosmology are grounded in empirical science, whereas others verge into metaphysical speculation. *CET's* fractal description of a pre-Big Bang scenario arguably resides within this latter metaphysical domain.

According to Joyce et al. (2000), the fractal nature of galaxy distribution at small scales is well established, and ongoing debate concerns deviations from fractality toward large-scale homogeneity. These authors observe a persistent resistance to fractal interpretations, attributed largely to the conviction that fractal matter distributions are incompatible with

standard cosmological frameworks-especially the high isotropy observed in the cosmic microwave background radiation (CMB) (p. 2). They point out that if fractality is defined as self-similar and intrinsically fluctuating matter distribution at all scales, it seems to contradict the Cosmological Principle (CP), which demands isotropy and homogeneity. Nonetheless, Joyce et al. conclude that fractal matter distributions-absent any definitive homogeneity scale-can still be accommodated within the context of an expanding Friedmann universe.

Pietronero & Labini (id.) reinforce this perspective, noting a consensus that galactic structures exhibit fractality up to scales of approximately 30-40 megaparsecs. They emphasize that “galaxy structures are fractal no matter what the crossover scale,” a fact they contend has been insufficiently appreciated (p. 126). Echoing Joyce et al., these authors critique common misunderstandings surrounding the Cosmological Principle.

That homogeneity is necessary to satisfy it, and in particular that a fractal distribution contradicts it. Understood as a principle which states the equivalence of all points, the CP only implies homogeneity when one assumes analyticity. More specifically, it is quite reasonable to assume that the earth is not at a privileged position in the universe and to consider this as a principle, the CP. The usual implication of this principle is that the universe must be homogeneous. This reasoning implies the hidden assumption of analyticity that often is not even mentioned. In fact, the above reasonable requirement only leads to local isotropy. For an analytical structure this also implies homogeneity. However, if the structure is not analytical, the above argument does not hold. For example, a fractal structure is locally isotropic but not homogeneous. This means that a fractal structure satisfies the CP in the sense that all the points are essentially equivalent (no center or special points), but this does not imply that these points are distributed uniformly (p.129).

Pietronero & Labini (id.) argued that the fractal nature of cosmic structure represents a radically new perspective-one that is often difficult to accept within the scientific community. Nonetheless, they emphasized that this perspective is grounded in the most rigorous data and analyses available as of 2000, rendering it neither speculative nor hypothetical, but a well-established empirical fact. They acknowledged the theoretical challenge posed by the absence of a dynamical model explaining “how such a fractal Universe could have arisen from the pretty smooth initial state we know existed in the Big Bang” (p. 130). Importantly, they distinguished between empirical truth and theoretical explanation, stating: “the fact that something can be hard to explain theoretically has nothing to do with whether it is true or not. Facing a hard problem is far more interesting than hiding it under the rug by an inconsistent procedure” (p. 130).

Grujić & Panković (2009) further highlight that the question of cosmic structure intersects with longstanding philosophical puzzles regarding the nature of space and time-issues that have engaged thinkers from Democritus and Aristotle to Leibniz, Berkeley, Mach, and Einstein. These authors note the current controversy surrounding the Universe’s actual structure, which ranges from one extreme-the standard cosmological paradigm positing spatial homogeneity with local inhomogeneities that smooth out on sufficiently large scales-to the opposing view that the Universe exhibits a hierarchical, fractal organization. The latter perspective suggests that the observed large-scale homogeneity may reflect present observational limitations in resolving higher-level hierarchical structures. Grujić &

Panković conclude that a fractal characterization of cosmic structure remains a viable and compelling approach (p. 7).

Unlike the standard cosmological paradigm, which asserts that the universe is homogeneous and isotropic, fractal paradigm is based on the so-called Conditional Cosmological Principle, as formulated by Mandelbrot, which asserts that Cosmos appears isotropic from any occupied point of space. This principle appears less restrictive and more in accordance with general epistemology of science, which is particularly evident in the case of Quantum Mechanics and definitely less metaphysical. The principle treats the observer and the object on equal footing, what appears more acceptable than the usual “God’s eye” perspective.

Another proponent of the fractal paradigm is Sergei Haitun (2014), who defined cosmology as the study of the Universe as a whole, while emphasizing that only the interior of a sphere with a radius of approximately 13.8 billion light-years is accessible to observation. Haitun cautions that cosmology is often burdened with overly strong or even fantastical hypotheses, which are nonetheless frequently accepted by cosmologists as statements “strictly proven by science.” I commend Haitun’s effort to simplify the cosmological worldview by adhering to the principle of economy of thought, thereby discarding extravagant assumptions. His approach rests on a single hypothesis, which he does not consider fantastical: the Universe is fractal. From this foundational premise, Haitun explores a series of controversial yet illuminating consequences throughout his article.

Grujić (2002, 52) asked: is the universe fractal or not? He explains that the observed nonuniform distribution of galaxies (clusters, superclusters, etc) does not contradict the principal assumption of the majority of modern cosmological models (at least those based on General relativity) that the universe is homogeneous and isotropic (cosmological principles):

The question is now could the two concepts, uniform universe and fractal cosmos, be reconciled? To put it differently, the question is if a hierarchical structure does appear, up to which cosmic scale it persists. The next question is if an eventual fractal distribution is observed, could it be described by a simple fractal model or one must contrive a multifractal cosmos?

1.4. Valamontes’s Coherence Cosmology

Valamontes’s model-termed *Coherence Cosmology*-is arguably the closest scientific analogue to our *Consciousness Endomiosis Theory (CET)*, which, while strictly metaphysical in nature, is capable of inspiring scientific formulations. Valamontes observes that, within the dominant cosmological paradigm, the earliest empirically accessible moment is the emission of the cosmic microwave background, marking the decoupling of photons from matter and the onset of thermodynamic time. In this framework, the emergence of light becomes synonymous with the beginning of visibility, causality, and structured physical law. However, this thermodynamic-first narrative presupposes that spacetime, energy, and entropy emerged *ex nihilo*, without the mediation of an underlying coherent field substrate.

Valamontes challenges this foundational assumption by drawing on recent developments in geometric cosmology, which suggest that the universe may have originated not from disorder, but from a primordial state of coherence. Specifically, he references theoretical models such as the *Dodecahedron Linear String Field Hypothesis (DLSFH)* and the

Superluminal Graviton Condensate Vacuum (SGCV), which propose that a quantized field of geometric coherence-not thermal fluctuation-preceded the Big Bang (Valamontes, 2024: 3).

According to Coherence Cosmology, the earliest state of the cosmos comprised a network of field-aligned potentials arranged in dodecahedral symmetry and embedded within a superluminal graviton condensate. These coherence nodes sustained energy without particle individuation, and symmetry without thermodynamic irreversibility. Valamontes reinterprets the “burst of light” at the Big Bang not as an origin *ex nihilo*, but as a phase transition: the *decoherence* of geometric potential into observable radiation, matter fields, and directionally propagating time. In this pre-Big Bang coherence cosmology, geometric order-not entropy-functions as the initiating principle of cosmic evolution. Through the formalization of DLSFH-SGCV dynamics, Valamontes contends that coherence-based field interactions underlie the emergence of both spacetime and energetic asymmetry.

Prior to the existence of photons or baryons, Valamontes envisions the universe as a network of nested, self-similar fields. This principle of self-similarity-reminiscent of fractal structuring-is central to CET, as will be discussed in subsequent sections. These self-similar fields maintain energy in stable, low-entropy configurations that, according to Valamontes (2024: 3-4), “are the true progenitors of spacetime curvature, redox asymmetry, and eventually matter. In this view, coherence is ontologically prior to dynamics. It frames causality, determines what transformations are possible, and serves as the substrate from which fields and particles eventually decohere.”

In contrast to standard cosmological models, which treat the pre-Big Bang state as a singularity -that is, an undefined or unknowable condition where physical laws break down-Valamontes’s *Pre-Big Bang Coherence Cosmology* characterizes this phase as a physically real, highly ordered regime defined by stable geometric coherence. In this primordial phase, time as we understand it -emerging from entropy gradients and causal propagation- does not yet exist. I find this view genuinely innovative. I agree with Valamontes’s proposal that, in this pre-temporal state, the universe exists in a condition of pure coherence, wherein information is spatially structured but not temporally expressed (p. 5):

There is no arrow of time, no radiative emission, and no expansion. The vacuum, though structurally active, is thermodynamically silent. Because this regime lacks photons or radiation pressure, it cannot be observed using current astrophysical instruments. Nevertheless, its coherence can be modeled mathematically and indirectly inferred from systems that exhibit similar coherence-dependent symmetry breaking, such as dark oxygen production (DOP) in deep-ocean mineral structures.

Valamontes maintains that, as coherence accumulates, nested layers of dodecahedral energy fields increasingly saturate the available vacuum coherence potential. This accumulation reaches a critical point-a geometric threshold-beyond which additional coherence cannot be sustained without undergoing a transformative phase shift. This threshold is conceptually analogous to what I previously termed the “endomitotic limit” (Pulido, 2021), the point at which the “fractalization of Brahman” can no longer proceed. Valamontes describes this process as follows (2024: 5):

At this critical point-analogous to phase saturation in condensed matter systems-the coherence field becomes unstable, and a topological transformation is triggered. This threshold marks the boundary between

pre-Big Bang coherence and emergent dynamics. It is not an explosion in the conventional sense, but a geometric symmetry collapse: a field-level reconfiguration in which coherence fragments into observable energy modes. The “Big Bang” is therefore reinterpreted as a coherence bifurcation, not a temporal origin.

According to Valamontes, as coherence saturates the Superluminal Graviton Condensate Vacuum (SGCV) landscape, the nested dodecahedral geometries reach a critical density—what we, within *CET*, term the *endomitotic limit* (Pulido, 2021). Beyond this point, the system can no longer maintain phase stability. This saturation threshold triggers what Valamontes calls a *coherence bifurcation*: a geometric-to-radiative transition wherein quantized energy, previously held in symmetry fields, is released in the form of photons, gravitons, and entropy gradients.

The most profound implication of Valamontes’s framework is that time, entropy, and matter share a common origin in a topological collapse. Each emerges from the same event—the transition from coherence to dynamic instability. This single bifurcation event generates the dimensional, thermodynamic, and material properties of the cosmos. In this view—and this is the key conceptual turning point—the Big Bang is not a “bang” in any conventional sense, but a *topological event*: a symmetry-breaking transition that gives rise to multiplicity. As Valamontes emphasizes, the primordial lattice does not explode; it *unfolds*. From this unfolding arises everything we associate with empirical reality: temporality, thermodynamic irreversibility, and materiality. The cosmos, then, is not the outcome of explosive expansion, but of *structured decoherence*.

Valamontes (2024) eloquently reminds us that in many spiritual and philosophical traditions, creation does not begin with matter or energy, but with *form*: with *Logos*, number, word, or vibration. This insight resonates deeply with *CET*, where vibration serves as the central metaphor for the pre-Big Bang scenario. As Valamontes explains (2024: 10):

DLSFH reinforces this idea by positing that dodecahedral geometry precedes particles and light. Geometry becomes the ontological substrate—that which is before anything acts. This perspective aligns with Platonic and Pythagorean notions of a cosmos built from form, and echoes theological concepts where creation is described not as making something from nothing, but as ordering what is already implicitly present. In the SGCV-DLSFH framework, structure is not a product of energy—it is its precondition.

Coherence Cosmology reconceptualizes the origin of the universe, not as an abrupt emergence from nothingness, but rather as a continuous transformation from *being* to *becoming*. Valamontes articulates this idea explicitly (2024: 11):

The pre-Big Bang state is geometrically complete, yet dynamically silent. The universe exists—but does not yet act. The birth of light, time, and matter is a transition from stability to interaction, from unity to multiplicity. This echoes philosophical traditions in which creation is a move from divine stillness to manifest expression. In such readings, the Big Bang is not a material origin, but a revelation of structure. The cosmos does not begin in noise, but in the ordered silence of coherent form.

Valamontes's "coherence-first" model unifies scientific and metaphysical worldviews by identifying a shared foundational principle: structure that precedes visibility. This aligns closely with *CET's* *Consciousness-only* or *Brahman-only* model. Valamontes posits that "the boundary between physics and meaning lies not in the material, but in the relational. Coherence is inherently relational-it defines how entities exist in context, how energy is distributed, and how symmetry is sustained or broken" (2024: 11).

Unlike Valamontes's scientific proposal, *CET*, as a purely metaphysical account, allows one to advance a step further by explaining not only how, but also why the pre-Big Bang cosmos unfolded as it did, and why a "topological collapse," in Valamontes's terms, was inevitable. Insights from nondual Vedānta philosophy prove invaluable in illuminating these deeper ontological questions.

2. Nondual Vedānta and scientific cosmology

Vedānta –most notably *Advaita* or Nondual Vedānta– is a spiritual tradition that can be articulated fruitfully alongside the concerns of modern cosmology. The idea that science and Vedānta are engaged in a search for the same fundamental reality has been advanced by numerous scholars who, in recent years, have highlighted the convergence between physics –particularly cosmology– and Vedānta.²

Duquette (2011) identifies two principal theoretical issues in quantum physics that underpin claims of compatibility with nondual Vedānta. First is the role of the observer in measurement, which implies that Consciousness (or mind) is fundamental to our description of reality. Second is the notion of the wholeness of physical reality-the idea that the universe constitutes an undivided whole, in which all parts are interconnected. Raman (1997) asserted that both science and Vedānta aim to uncover the nature of Ultimate Reality, referred to as *Brahman* in Vedantic terminology. Although they share a common goal, essential differences exist between the two traditions, particularly in their methodologies, foundational assumptions, and the nature of their outcomes. Raman highlights several key distinctions:

- Vedānta does not seek to describe the empirical world but rather to reveal its inner essence.
- Vedānta does not focus on the specific details of the phenomenal world; instead, it discloses the nature of the substratum of the universe in its totality.
- Vedānta investigates what is permanent and eternal-the unchanging principle-rather than measurable quantities that are subject to change.

Complementing this view, Chaturvedi (2024) suggests that both modern physics and Advaita Vedānta embody profound quests for ultimate unity. He explains:

While they approach this search from vastly different perspectives and methodologies, both challenge us to transcend our ordinary perceptions and conceptions of reality. The journey of physics towards ever more comprehensive unification theories reveals a cosmos of astounding interconnectedness

² Among others: Raman, 1997; Boyer, 2007, 2008, 2009; Duquette, 2011; Mukhopadhyaya, 2012, 2013; Pal, 2013; Kafatos and Chopra, 2014; King, 2015; Bhar and Baharat, 2018; Mahato, 2018; Hari, 2018; Sharma B., 2017; Sharma S., 2018; Bajpai, 2019; Sidorova-Biryukova, 2020; Jhunjhunwala, 2021; Sarker, 2021; Sridhar and Nagendra, 2021; Nityayogananda, 2023; Gain, 2023; Hejjaji, Sadasivan and Padmakumar, 2023; Purram, Rao and Charanarur, 2023; Giammarchi and Guzzardi, 2023; Shrivas et al., 2023; Chaturvedi, 2024; Aithal and Srinivasan, 2025.

and underlying simplicity. From Maxwell's unification of electricity and magnetism to the ongoing search for a Theory of Everything, this quest has continually expanded our understanding of the universe. Similarly, the nondual vision of Advaita Vedānta presents a radical understanding of reality as fundamentally one.

Leong (2025) argues that Consciousness is best understood within the metaphysical framework of the Upanishadic doctrine of *Atman-Brahman* unity-what Chaturvedi (2024) refers to as "ultimate unity." Leong further contends that this framework "can serve as a foundational paradigm capable of bridging ancient philosophical insight with current scientific developments in quantum holism, neurophenomenology, and Consciousness studies" (p. 1).

Similarly, Gain (2023) observes that science and Vedānta share the same ultimate objective but employ markedly different methodologies to attain it (p. 104):

Science first began by studying all of the "out there" items in the universe-their functions and materials. Scientists desired to learn more about these items and comprehend the universe's fundamental components as their grasp of science advanced. They began searching inward from molecules, progressed to atoms, subatomic particles, quarks, and strings, and are now seeking the unifying force that serves as the universe's fundamental building component.

(...) Vedānta takes a different method, it began exploring 'in here,' and the ancient Rishis discovered that the one unifying force is inside themselves, while science and quantum physics have hit a wall at this point. They realized that the fundamental reality of the cosmos is this one unifying power. On the basis of this, they postulate that the physical cosmos we see results from the division of this unified reality into an unlimited number of distinct items. Science first looked "out there" before turning within to discover the fundamental truth. To comprehend the universe, Vedānta first began "in here" and then expanded outward. Therefore, it would seem that science and Vedānta are seeking the same fundamental reality

Chaturvedi (2024) highlights a crucial methodological difference between modern science and nondual Vedānta. He argues that modern science predominantly employs a deductive approach, relying on empirical observation, and in its quest for the ultimate cause of the universe has reached the level of quantum particles, where it encounters inherent uncertainty. In contrast, Vedantic inquiry, which postulates *Brahman* as the substratum of the observed world, adopts an inductive approach, involving an inward journey through disciplined practices undertaken by the seeker of truth. I concur with Chaturvedi's observation that the Big Bang theory-with its depiction of the universe emerging from an infinitesimally small, infinitely dense point-"resonates in intriguing ways with the Hindu concept of the universe cyclically manifesting from and dissolving back into Brahman" (p. 16).

Hedrich (2006) notes that string theory's metaphysical implications have attracted philosophers and thinkers. He suggests that the Vedic interpretation of string theory reveals a remarkable relationship between modern physics-still in pursuit of an all-encompassing

theory-and the insights of Vedic philosophy, which similarly aims for a consistent worldview integrating quantum mechanics and string theory.

Pal (2013) argues that Gurzadyan and Penrose's *CCC*, which portrays an eternal, cyclical cosmos in which our universe transitions through successive "aeons," aligns closely with the concept of *kalpa* found in Vedānta philosophy. Pal equates *Brahman* with the scientific notion of the void, which he clarifies should not be interpreted as "nothingness" but rather as a "source of infinite energy" (p. 307). He introduces the concept of Thought Force (TF) as "an expression of the universal Consciousness which exists along with the universe," a notion compatible with our *CET*. For Pal, TF constitutes "the primordial quantum field that, in turn, functions as the primary unified field." Pal (2013a) further explains that many physicists hypothesize a single super-force governing the earliest moments of creation-a force that he identifies as the Thought Force. Echoing similar reasoning, Pal suggests that the evolution of all fundamental fields may originate from this TF.

Boyer (2007, 2008, 2009) offers an intriguing proposal regarding the nature of *Brahman* as a "unified field." His arguments bear notable parallels to ideas in *CET*. Boyer conceptualizes the ultimate wholeness-a completely unified field prior to any differentiation – as analogous to mathematical notions such as the empty set, zero, or one (Oneness). This unity is further reflected in the dual notions of the eternal Void (emptiness) and eternal Beingness (fullness):

As the source of everything the unified field would contain all potential, all order, all phenomena-it would not be a static ground state needing something else to express it. All phenomenal realities would be partial reflections of the total reality of the unified field, the ultimate infinite eternal. The infinite eternal totality would limit itself into increasing levels of localization, discreteness, and mass-limitations of the infinite eternal *that is already present everywhere*. From that perspective spacetime would not have to begin at a point and expand out in all directions from an almost infinitely dense singularity, a Planck-size quantum, or nothing blasting out in a big bang. Rather infinite space and eternal time would phenomenally *condense* many 'points' simultaneously (everywhere) within the unified field. The subtlest finite space would be the closest to the infinite eternal. In gross conventional spacetime, the infinite would appear completely hidden such that discrete, independent, localized finite objects are the predominant phenomena (p.479).

Boyer (2007) observed that, within Maharishi's Vedic Science, the mechanics of manifestation at all levels are characterized by the self-interacting dynamics of the unified field curving back upon itself. He explains:

At the unified level it can be associated with infinite self-referral, infinity in each point. At the ultramicroscopic level it can be associated with a mandala form (like a circle or sphere) as in the concept of *Hiranyagarbha* or cosmic egg, the manifest nonlocal cosmic expanse within infinite eternal spacetime. At the ultramicroscopic level it can be associated with curving back into discrete units such as point particles, quanta, and atoms which comprise the microscopic and macroscopic phenomena of our ordinary physical world (p. 480).

From this ultimate perspective, Boyer (2007) concludes that individual Big Bang-like events may occur with respect to specific black holes within conventional spacetime and ordinary gravity. However, regarding the totality of existence, "the Big Bang would not be

an explosion to something outside the unified field, because everything resulting from it would remain inside it. It would not create spacetime but rather be a limitation of the infinite eternal unified field—perhaps a ‘big condensation’ but not a ‘big bang’ creating spacetime from literally nothing” (p. 480).

Authors such as Pal (2013, 2013a) and Boyer (2007, 2008, 2009) have attempted to formalize the connections between modern scientific concepts and the philosophical doctrines of Hinduism, particularly Vedānta. In this respect, they constitute a minority, as most scholars who address the relationship between scientific cosmology and Vedantic metaphysics tend to emphasize parallels or analogies rather than substantive integration. *CET*, by contrast, advances this discourse by proposing explanatory frameworks that interpret certain physical phenomena—such as the origin of the four fundamental forces and the role of black holes in cosmic evolution—through Vedantic spirituality. Leong (2025) is an exception as he explicitly recognises a substantive integration between Vedānta and science. According to him, although the *Upanishads* do not use the language of field theory or quantum entanglement, “their descriptions of *Brahman* as all-pervading, indivisible, and unbounded align closely with the modern understanding of quantum fields as non-local structures from which particles and interactions emerge” (p.4). What emerges in Leong’s paper was not simply a comparative thesis but a new framework for the science of mind:

A framework in which *Atman* is not an idea but a realization; *Brahman* is not a belief but a cosmic field of awareness; and *mokṣa* is not transcendence of the world but the recognition that one is the world, seen from within. To recover this truth is not to abandon science, but to complete it. It is to reclaim Consciousness not as anomaly but as origin, not as puzzle but as principle (p.12).

In the remainder of this article, we aim to deepen *CET*’s approach by articulating a more comprehensive metaphysical account of the “pre-Big Bang scenario” and its correspondence with current scientific models.

3. Brahman or Consciousness Endomitosis

3.1. Some preliminary remarks

Chaturvedi (2024) said that his book *Cosmic Origins: Bridging the Big Bang and Brahman* emerges from a deeply held conviction that there is significant value in fostering dialogue between the seemingly disparate perspectives of physics and Vedānta. I fully share this conviction. His work represents an effort to integrate the empirical findings of modern science with the profound metaphysical insights of Hindu philosophy—particularly the concept of *Brahman*—in order to construct a more comprehensive understanding of cosmic origins and the nature of reality. This integrative approach also reflects the purpose of *CET*. Chaturvedi reminds us that the Big Bang theory, “with its description of the universe emerging from an infinitesimally small, infinitely dense point, resonates in intriguing ways with the Hindu concept of the universe cyclically manifesting from and dissolving back into Brahman” (p. 16).

We begin our analysis by examining Image 1 (below), a widely recognized graphical representation that illustrates the expansion of spacetime and the evolution of the universe from the initial singularity commonly referred to as the “Big Bang.”

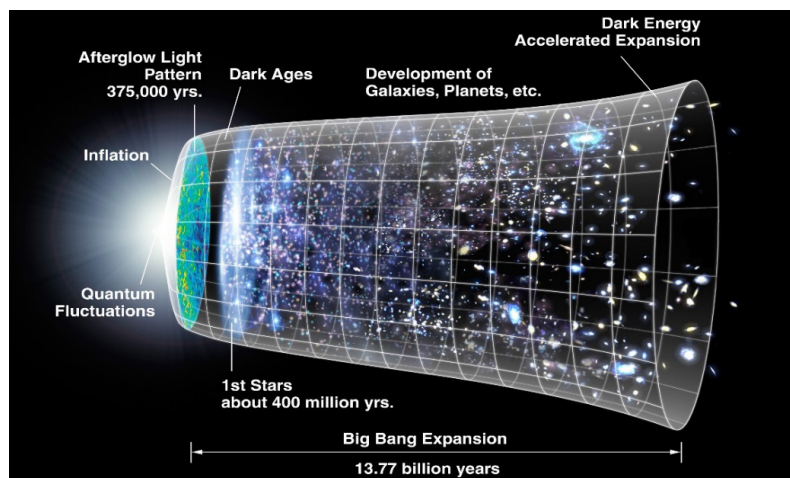


Image 1. Timeline of the expansion of the universe.

Source: https://en.wikipedia.org/wiki/Big_Bang#/media/File:CMB_Timeline300_no_WMAP.jpg

(A more detailed explanation of this image can be found in Bazaluk, 2016.)

If we take this image as the point of departure for introducing *CET*, we may assert that the theory's central purpose is to investigate the ontological nature of the “black background” depicted therein. Drawing on the philosophical framework of Advaita Vedānta, we will henceforth refer to this background as *Brahman*. Within the context of *CET*, Brahman and Consciousness are treated as synonymous. An alternative designation for our proposal could therefore be the *Brahman Endomitosis Theory*. While terms such as God, Ground of Being, Absolute, Supreme Source, Tao, or Ultimate Reality are used across various traditions to denote a comparable metaphysical referent, all of these—including Brahman—carry specific cultural, theological, or philosophical connotations that may obscure, rather than illuminate, the explanatory objectives of this model.

As I have previously noted (Pulido-Moyano, 2022: 7), Advaita Vedānta characterizes Brahman by several core attributes:

Advaita Vedānta, drawing primarily on the scriptural authority of the Upaniṣads, asserts that Brahman is *uncaused* and *unconditioned* because it is eternal [*nitya*] and infinite [*ananta*]. Brahman is not composed of parts or subject to division, for it is pure being [*śuddha-sattā*], beyond all form and differentiation. It remains untouched by relationality or interaction, as Brahman is non-dual [*ekam eva advitīyam*]-One without a second. Moreover, Brahman transcends linguistic and conceptual grasp; it is not contingent upon language, for words and concepts cannot reach it [*yato vāco nivartante aprāpya manasā saha*].

A preliminary clarification is essential. Within the framework of *CET*, Brahman cannot be properly understood as a “background,” since nothing exists apart from it—nothing that could serve as a contrasting “foreground.” Therefore, although the metaphor of a background may serve pedagogical or illustrative purposes, it is ontologically misleading. Upon examining Image 1, one might be tempted to interpret the black area as a kind of vast container into

which the universe explosively expanded—a spatial field far surpassing the observable cosmos, whose boundary is defined by the reach of light (approximately 13.8 billion years). While such an interpretation may seem intuitive, it is fundamentally mistaken.

If physical space itself emerged with the Big Bang, then no pre-existent physical-spatial container could have existed. Brahman, as conceptualized in *CET* and in Advaita Vedānta, does not exist within space; rather, it transcends the very concept of spatial extension. Accordingly, *CET* posits that *Brahman* is infinite, not in the sense of boundless spatiality, but in terms of beyond-spatiality. *Brahman* is not “located” anywhere, as location is a spatial predicate inapplicable to that which precedes the emergence of space.

Let us recall Grossman’s observation cited at the beginning of this article, in which he asserts that the Big Bang is undoubtedly a happening and, as such, must have a cause or reason. However, this cause cannot be something *in* time (or space), because time [and space] itself comes into existence with the Big Bang. Thus, the cause must be something that exists outside of time [and space]. In the same vein, if time originated with the Big Bang, then Brahman did not “come into being,” does not “evolve,” and will never “cease to be.” *CET* therefore considers Brahman to be eternal, not in the sense of temporal endurance, but in the sense of beyond-temporality. Grossman’s words again illuminate this point (2014: 63):

If we agree to use the word “eternal” to refer to anything that exists outside of time (and this is Spinoza’s usage) it is clear that the entire physical universe as we experience it—the world of things in space and time—depends for its existence on causes that are eternal. Furthermore, since the cause of the big bang is eternal, i.e. it is not a temporal process that begins to exist or ceases to exist in time, it follows that this cause exists “now,” and not only at the moment, so to speak, of the big bang. Therefore, the spatio-temporal universe must be continuously emanating from its eternal cause.

Hence, within the framework of *CET*, the question “What was there before the Big Bang?” is not simply unanswered—it is fundamentally ill-posed. There was no “before,” no “when,” no temporal dimension in which a prior condition could be located. Moreover, since matter and energy also emerged with the Big Bang, Brahman cannot be regarded as the scene of any interaction, as there existed neither distinguishable entities nor even a singular differentiated entity to serve as *relata*. Brahman is not an environment in which things happen, but the nondual foundation of all that appears to happen. To this same question (“What came before the Big bang?”), Chopra & Kafatos answered with these words:

Mystery 1: What came before the Big bang?

Answer: A pre-created state of Consciousness, which has no dimension. In this state, Consciousness is pure potential. Everything exists in seed form. These seeds are made of nothing that can be empirically measured. Therefore, to claim that there was nothing before the big bang is just as correct as saying that everything existed before the big bang.

Brahman may be described as a kind of *field*—not a field within space or time, but beyond the physical, a *meta*-physical field—that gives rise to the very appearance of space, time, and matter. Brahman resembles the *quantum vacuum* and, at the same time, the *cosmic plenum*, in Ervin Laszlo’s terms (2007: 67). As we will see later, within the infinite Brahman’s *quantum vacuum*, the structure of the recursive sentence (“I AM AWARE that I am aware”) that replicates itself by endomitosis would correspond to what Laszlo (id., 68) calls the “Ākāśha

field” or the field of *in-forma-tion*, defined as “a subtle, quasi-instant, non-evanescent and non-energetic connection between things at different locations in space and events at different points in time.” Laszlo argued strongly for the existence of the Akashic field, or “A-field”. As he said: “The time has come to add another field to science’s repertory of universal fields (...) a further field in required to account for the special kind of coherence revealed at all scales of natures” (p.75). Laszlo chose the name “Ākāsha” for this field, and justified his choice:

In the Sanskrit and Indian cultures, Ākāsha is an all-encompassing medium that *underlies* all things and becomes all things. It is real, but so subtle that it cannot be perceived until it becomes the many things that populate the manifest world. Our bodily senses do not register Ākāsha, but we can reach it through spiritual practice.

In physics, a field vibrating through spacetime manifests as a wave. Brahman, transcending spacetime, may analogically be described as an infinite and eternal field engaged in a constant self-referential vibration. *CET* proposes that this primordial vibration gives rise to an apparent bifurcation between two fundamental aspects of Brahman: *beingness* and *awareness*.

In *CET*, Brahman is also referred to as Reality and as Consciousness, terms that are used interchangeably due to their ontological equivalence: Brahman *is* Consciousness (or Reality). However, challenges emerge when the corresponding adjectives *-real* and *conscious-* are employed, as their conventional meanings diverge. While all things that are *conscious* are indeed *real*, not all *real* things are *conscious*.

To clarify: in *CET*, the adjective *real* is ultimately redundant. Why? Because nothing is “unreal” in any absolute sense. If “real” is narrowly defined as that which is physically existent or sensorily perceptible, then numerous abstract entities—such as numbers, dreams, or logical relations—must be excluded. But if we adopt a broader, ontologically inclusive definition, then the very notion of an “unreal thing” becomes incoherent.³

In contrast, the adjective *conscious* retains full significance within *CET*. Unlike panpsychism, which posits that all entities—including atoms, particles, and inanimate objects—are conscious in some degree, *CET* adheres to a more stringent criterion: pencils, rocks, molecules, or atoms are not *conscious*. While such entities may exhibit sensitivity or causal responsiveness to internal or external stimuli, they lack any cognitive representation of themselves or of their surroundings. In other words, *being sensitive* is not equivalent to *being conscious*.

Nevertheless, *CET* maintains that Brahman is known by as many names as there are apparent entities—conscious or not—since all things are expressions, modulations, or instantiations of *Brahman*. However, not all entities are aware of themselves, of their environments, or—more profoundly—of their ultimate identity as Brahman. As proclaimed by Valmiki, the Indian author of the Vedantic text *Yoga Vāsishtha*:

There is no distinction between the sentient and the insentient, between inert and intelligent: there is no difference at all in the essence of substances, for the infinite Consciousness is present everywhere equally. The differences are only due to the intelligence identifying itself as different substances. The same infinite Consciousness is known by different names in these different substances (trans. by Venkatesananda, 1993: 81).

³ As Kingsley (2006) suggests in his interpretation of Parmenides’ poem, to think of something is already to endow it with being—to *real*—ize it. Therefore, while the distinction between the real and the unreal may serve pragmatic purposes, it becomes ultimately untenable.

3.2. Three axioms and a corollary.

These preliminary observations are important for a proper understanding of our cosmological theory based on the concept of the endomitosis of Consciousness. The foundational axioms of *CET* are as follows:

- *Axiom 1: Only One “Substance”*. Brahman -also referred to as Consciousness- is the sole ontological substance of reality. As I wrote in my first article (Pulido-Moyano 2021: 95), “Consciousness is the unique and absolute ontological primitive. Hence Consciousness is ultimately all there is to any physical structure and to any mental process”. Brahman/Consciousness is the only existing substance: eternal, infinite, and uncaused. Consequently, Brahman is indivisible. Any division, distinction, or difference between allegedly separate entities within Brahman is merely apparent-phenomenal rather than ontological. For this reason, Brahman alone merits the designation *atom*, in the original Greek sense of *ἄτομος* -that which is uncut, indivisible.
- *Axiom 2: Only One “Movement”*. All that Brahman “does,” in a metaphysical sense, is to *vibrate*. This primordial and spontaneous vibration constitutes the sole “movement” or activity attributed to Brahman in the *CET* framework.
- *Axiom 3: Only One “Purpose”*. Brahman vibrates with a singular inner tendency: self-replication. This is its only inherent “purpose,” so to speak. As Valmiki, the author of the classical nondual Vedantic text *Yoga Vāsiṣṭha* states, “these vibrations are natural and inherent in the infinite Consciousness,” and “they are not motivated” (id., pp. 86-87). The phrase “not being motivated” signifies that Brahman possesses absolute freedom -it is not subject to any external causality or command. However, Brahman is not to be construed as a deity or “Supreme Being” possessing intentionality, desire, or will, despite the metaphorical use of such terms in spiritual literature. Rather, Brahman is “blind” and pure Consciousness engaged in a perpetual act of self-replication. This intrinsic tendency is all that Brahman does-and it cannot refrain from doing so.
- As a corollary of axioms #1 and #2, we can say that no-thing (no “form”, no “object”, no “phenomenon”) has a real independent existence. No-thing has a nature of its own. The only and indivisible substance is Brahman. Therefore:
 - a) Things are made solely out of Brahman, though they take on apparently different forms and textures;
 - b) Things can only arise and evolve within Brahman, though they seem to do so within a spacetime framework;
 - c) Things can only be conceived by Brahman, though they appear to be conceived by a human mind, or by any animal sensory-perceptual device or any sensitive property in biological or inert matter.

3.3. Brahman: the all-encompassing cosmic field that acts as a vibrating *ἄτομος*

Certain Vedantic scriptures describe Brahman as *sadasadbhyām* anirvacanīya, which can be rendered as indeterminable as to whether it is or is not. Being nondual, Brahman eludes categorization within the binary logic of existence and nonexistence. The *Upaniṣads*

frequently adopt an apophatic method (the *via negativa*), articulating what Brahman is not rather than what it is. Such formulations include phrases like “neither short nor long,” “other than cause and effect,” and “without an inner and an outer.”

Arguably the most concise and affirmative (cataphatic) description of Brahman appears in the *Taittirīya Upaniṣad*, in the mantra: *satyam jñānam anantam brahma*, which may be translated as “Brahman is infinite Beingness and Awareness”. In this context, *Beingness* -not to be conflated with *being*- corresponds to *satyam*, the true substance or ontological ground from which all apparent forms emerge. *Awareness* refers to *jñānam*, the intrinsic and inseparable capacity for knowing, which is consubstantial with *beingness*. These two aspects are not separate properties but mutually implicative dimensions of Brahman’s nature. The qualifier *infinite* (*anantam*) denotes that Brahman is absolutely unbounded -free from spatial, temporal, causal, or categorical limitation. It transcends all conceptual dualities related to form, function, property, and quality. Thus, Brahman is not merely that which exists, but both *all that exists* and *existence itself*.

One might be tempted to speak of Brahman as “absolute subjectivity,” yet this is ultimately misleading. The notion of subjectivity presupposes objectivity, and within Brahman there is neither. Brahman is infinite, eternal, indivisible, and uncaused, whereas form is always finite, composite, contingent, and temporally bounded. Brahman, lacking all delimitation, cannot possess any form whatsoever and therefore cannot be conceived of -even by Brahman itself- as an object. The human mind, which operates through the conceptualization of forms, cannot comprehend the formless. Moreover, Brahman is not a “subject,” for subjectivity requires the presence of an object over against which it can define itself. Since Brahman is the absolute totality-infinity, there is nothing distinct from it, no object that could establish such a relational polarity. Thus, Brahman transcends both subject and object, eluding all dualistic categories.

If Brahman were conceived as a rigid, immutable substance in a state of eternal and unbroken stillness, then *Image 2* could plausibly serve as its visual representation. In such a condition, Brahman would be governed by a singular metaphysical force: self-attraction, a force that resists differentiation, transformation, or movement, thereby preserving absolute stasis. (This force corresponds to *Force Type-1*, in section 3.7)



Image 2: Brahman as eternal perfect unbreakable stillness.

This conception of Brahman as eternal, perfect, and unbreakable stillness is depicted in Image 2. *CET* is grounded in a non-dual metaphysical principle: Consciousness (Brahman = $\mathfrak{B}$) is infinite, eternal, and indivisible. It is denoted symbolically as:

$$\mathfrak{B} = I^{\infty}$$

It reads as “Infinite I”, representing the singular first-person pronoun extended to infinity [[∞]]. It signifies the absolute, undivided “first personhood” of Brahman, prior to all subject-object distinctions.

The *Yoga Vāsishṭha* describes this condition in the following terms:

“After the cosmic dissolution and before the next epoch dawned, the entire objective universe was in a state of perfect equilibrium. There then existed the supreme Lord [Brahman], the eternal, unborn, self-effulgent, who is the all and who is omnipotent. He is beyond conception and description” (id., p.17.).

This denotes not a quantity or process, but an ontological absolute: pure Consciousness, unchanging and unmanifest. It does not participate in space, time, or structure.

In its “pristine state of pure and perfect stillness” (Pulido-Moyano, 2021), Brahman -here denoted as I[∞]- is pure Consciousness, and precisely because it is pure Consciousness, Brahman is not conscious of anything. In contrast, both *You* (the one reading these words) and *I* (the one who wrote them) are conscious of many things, because we are finite subject-objects: individuated loci of beingness/awareness -“atmans”- that possess cognitive representations of their own finitude and of a wide array of other finite subject-objects within a shared experiential domain (i.e., a world). However, from the perspective of *CET*, neither our condition as finite subject-objects nor the world we inhabit possess ultimate reality -if by this we mean something ontologically independent of Brahman. This position resonates with Duquette’s (2011) interpretation of physicist Bernard d’Espagnat, who argues that “quantum physics is not dealing with ‘objects-per-se’ but with representations-conceptual, symbolic, or mathematical-of these objects. Electrons, quarks, and their composite objects cannot be thought of as ‘self-existent’ entities” (p. 626). This idea clearly resonates with Donald Hoffman’s distinction between objective or ultimate reality and what he calls the “user interface” or “dashboard” of perception, i.e., conceptual, symbolic, or mathematical representations of ultimate reality (see Hoffman, Singh & Prakash, 2015; Hoffman, 2016 and 2019).

Brahman alone is real or, more precisely, Brahman *is* Reality. All entities and phenomena, including “you” and “me,” are ultimately expressions of Brahman, even if they appear to exist as differentiated subject-objects. *CET* will extend this ontological insight to its description of the universe’s origin.

Bazaluk (2016: 49) suggested the possibility that our Universe had existed in a perfect state of “nothingness or in empty space with a multitude of dimensions”. “Due to unknown reasons” -Bazaluk’s terms- such a mysteriously supersymmetrical state was broken and “a tiny bubble was formed -the embryo of our Universe that possibly arose as the result of considerable, but random fluctuations.” According to *CET*, those “unknown reasons” have to do with Brahman’s vibration and its consequences, as we will see now.

3.4. Brahman’s vibration

Image 1, though informative, may appear conceptually static or even aesthetically monotonous. Fortunately, Brahman is not limited to a state of perfect stillness (otherwise, there would not exist any universe!). Brahman has an intrinsic tendency-an “inner impulse,”

so to speak-to disrupt its own equilibrium. This disruption is not imposed from without, but arises freely and spontaneously from within Brahman itself in the form of primordial *vibration*.

This breaking of the original stillness is foundational to *CET's* cosmology, and is identified with *vibration*-the dynamic principle that underlies all manifestation. Several spiritual traditions, most notably *Kashmir Śaivism*, speaks of this vibration using the term *spanda*, referring to the creative pulse or subtle throbbing of the Absolute. In this view, vibration is not merely a physical phenomenon but a metaphysical force -the self-activation of Consciousness- through which the undifferentiated becomes the differentiated, and the infinite assumes the appearance of form.

Image 3 seeks to illustrate this fundamental vibration -*spanda*- as the generative force (known as *Force Type 2*. See section 3.7) that creates the foundation from which a phenomenal cosmos will emerge.

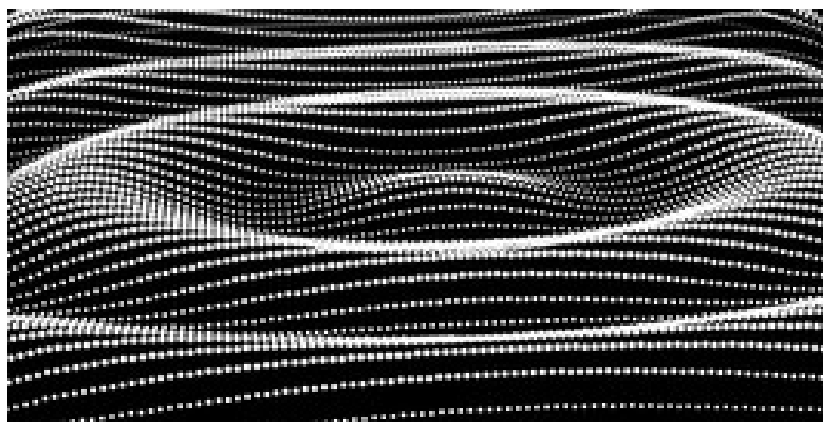


Image 3. A representation of Brahman's vibration.

This *vibration* constitutes the dynamic, recurrent, and creative activity of the Absolute. Far from being a deviation from Brahman's nature, it is the very expression of its innate freedom and spontaneity. In the context of *Kashmir Śaivism*, this principle is articulated with remarkable clarity. Dyczkowski (1987) describes this vibration in the following terms:

Spanda is the spontaneous and recurrent pulsation of the absolute objectively manifest as the rhythm of the arising and subsidence of every detail of the cosmic picture that appears within its infinite expanse. At the same time, *Spanda* is the inner universal vibration of Consciousness as its pure perceptivity (*upalabdhitā*) which constitutes equally its cognizing subjectivity (*jñatītvā*) and agency (*kārtṛtvā*).

In its turn, within the context of *Advaita Vedānta*, the *Yoga Vāsiṣṭha* offers a parallel yet non-dual interpretation of this primordial vibration. It describes it in the following terms:

In the supreme being there exists *the vibration which is at once equilibrium and disturbance*; on account of this there appear space and light and inertia, though they have not really been created. Since all this happens in Consciousness, they possess the quality of the knowable; at the same time there arises the

knower. It is the inherent power of Consciousness to illumine all things, hence it is the cosmic knower. That Consciousness itself becomes its own knowable and the knower. When such a relationship arises, the notion “I am a jiva, a living soul” arises in Consciousness (id, p.51, emphasis added).

Two particularly compelling insights emerge from these teachings. First, the idea that Brahman’s vibration is simultaneously *equilibrium* and *disturbance*-that is, an unstable equilibrium inherent to the very nature of Brahman. Rather than contradicting its stillness, this dynamic instability *is* its mode of expression, a paradoxical union of rest and motion. Second, the idea that space (understood as the quality of Being), light (as the quality of Consciousness), and inertia (as the quality of causality) all “happen in Consciousness” is foundational. In other words, Consciousness itself becomes both the knowable and the knowing. This insight provides the ontological groundwork for understanding Brahman as *One without a second*-non-dual, self-referential, and self-manifesting. As the *Yoga Vāsiṣṭha* puts it: “Time, space, action (or motion), and matter are all but different aspects of the one infinite Consciousness” (id., p. 160).

From within the undifferentiated ground of Brahman arises an intrinsic vibration, which is not causal in the empirical sense but signifies the first metaphysical modulation:

V: $\mathfrak{B} \rightsquigarrow$ modulation

When Brahman (I^∞) vibrates, each of its waves shows the apparent duality Beingness-Awareness. In *CET*, each wave generated by Brahman’s primordial vibration equals to -or is composed by- a thought of *Beingness* ontologically not different from a crest of *Awareness* (A). That is, metaphorically, the thoughts and the crests of Brahman’s waves correspond to Beingness and Awareness respectively. The waves seem to separate two dimensions or aspects of Brahman, though they are not-two (*a-dvaita*) or nondual. These two poles of the waves do not denote separate entities or dimensions, but rather complementary aspects of the same non-dual reality. The wave, therefore, does not divide Brahman; it articulates its intrinsic polarity within unity. The waves seem to separate two dimensions or aspects of Brahman, though they are not two. As I noted in the previous article (Pulido-Moyano, 2021: 95:

When the primigenial split occurred [Brahman’s vibration], each half [i.e., *satyam* and *jnanam*] appeared as a ‘alter’ to the other half. There is no difference of substance between them, no difference of size or any other quality, but now each side is a ‘subject’ from its own perspective and a ‘object’ from the perspective of the other side. (Once again, the very notion of ‘perspective’ is a concession, as perspectives require separation, and this is not the case yet.)

I said that being[ness] [*satyam*] is what Consciousness ‘sees’ from its aware [*jnanam*] ‘perspective’, and aware[ness] is what Consciousness ‘sees’ from its beingness [*satyam*] ‘perspective’. Chopra & Kafatos (2017: 164) succinctly declared “To exist is to be aware”. *Yoga Vāsiṣṭha* warns us not to fall into the error of believing that this separation is real:

That reality is the indivisible, infinite Consciousness, apart from which nothing is. That seems to undergo polarisation within itself, thus becoming aware of itself as its own object. This seems to create a division and partial knowledge, which is ignorance. Such awareness is inherent in Consciousness but it is nondifferent from Consciousness (id., pp. 526-527).

Why does Brahman vibrate? How is it possible for something to happen in Brahman? Why would it happen at all? It is not easy to give a convincing answer to this question. The answer provided by *CET* -actually, *CET*'s core argument- reads as follows: *Brahman's nature is the tendency to self-replicate, and Brahman vibrates in a (failed) attempt to self-replicate*. The *Yoga Vāsiṣṭha* holds the following argument:

“Consciousness is never without some movement within itself. Without this movement, it might become ‘unreal’. *Movement is the very nature of Consciousness and therefore inseparable from it*” (id., p. 572, emphasis added).

This is all that Brahman does -to vibrate-, and cannot stop doing. Brahman's vibration produces waves that can be described as alternate cycles of expansion and contraction. But let us be clear about it: all attempts by Brahman to self-replicate are doomed to fail. Brahman's self-replication is clearly a logical impossibility, since an infinite substance replicating itself would result in two equally infinite substances, and then neither of them, taken separately, would truly be infinite. There cannot be two “equal” infinities, though there can be many infinities of different kind, nature or magnitude (as explained in Cantor's metamathematics). Given that no self-replication of Brahman is possible because there cannot be two instances of the same type of infinity, all attempts to self-replications render finite instances.

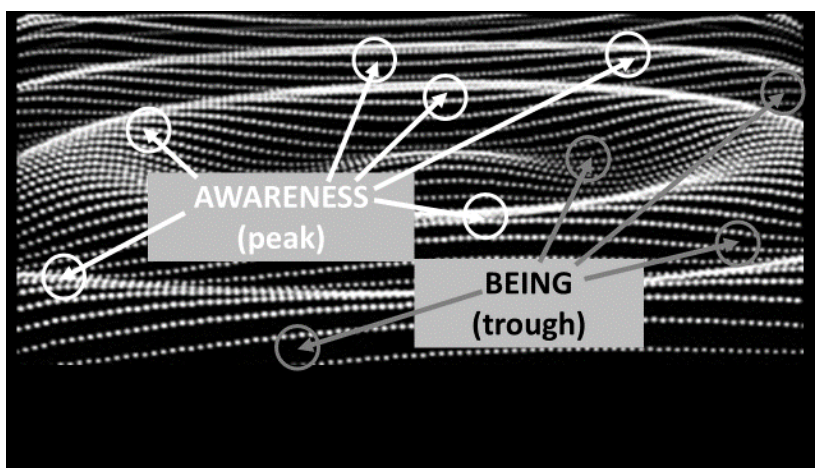


Image 4. Brahman's vibration produces waves with *Beingness* (troughs) and *Awareness* (crests).

As we can see, Brahman's vibration produces “waves” (Image 4). It is inherently challenging for the human mind to conceptualize the identity between Beingness and Awareness. This intrinsic difficulty is posited because mind itself is a derived manifestation of this apparent primordial dichotomy. Upon examining the waves generated by Brahman's vibration, as depicted in Figures 3 and 4, we observe that these waves are composed of a multitude of spherical “cells” (just a illustrative aid), present at both their crests and troughs. Figure 5 offers an illustration of this concept.

We emphasize that this visual representation should not be interpreted literally as a depiction of discrete entities (cells) in three-dimensional space. Rather, it serves as a heuristic construct to facilitate the understanding of a metaphysical principle. Although these cells

are visualized with spherical shape, this morphology is merely an analogical resource for clarification. Consequently, there is no actual separation between these “cells”. Given the nature of Brahman, conventional notions of distance, fragmentation, or three-dimensional physical space are inapplicable and irrelevant in elucidating its essence.

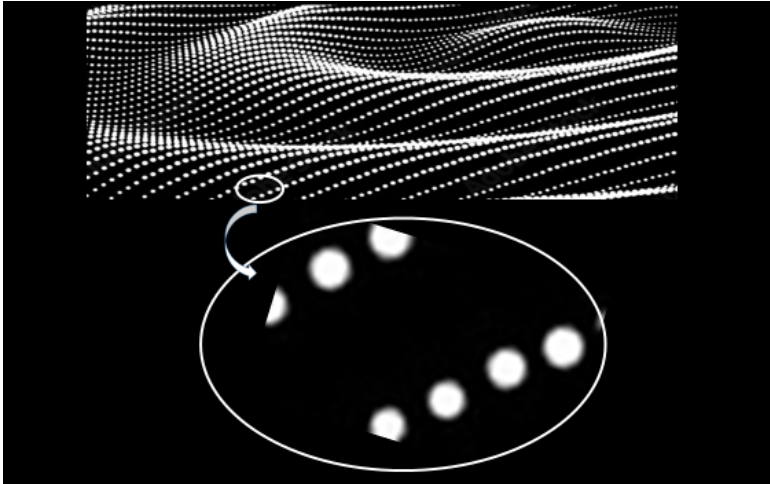


Image 5. Each wave is made of a myriad of cells.

All cells are identical, irrespective of their “location” at the crests or troughs of each wave. This implies a fundamental uniformity underlying the apparent variations. The vibration itself signifies a rupture of perfect equilibrium. Once this primordial equilibrium (as depicted in Figure 1) is disturbed, a counter-movement to restore it is immediately initiated (see Figure 2). We can conceptualize this dynamic as occurring across the infinite expanse of Brahman: equilibrium is perpetually disrupted and subsequently re-established -through dissipation of the waves- in myriad “regions” of Brahman. This ongoing oscillation between states of disequilibrium and re-equilibrium is central to understanding the dynamic nature of Brahman’s manifestation.

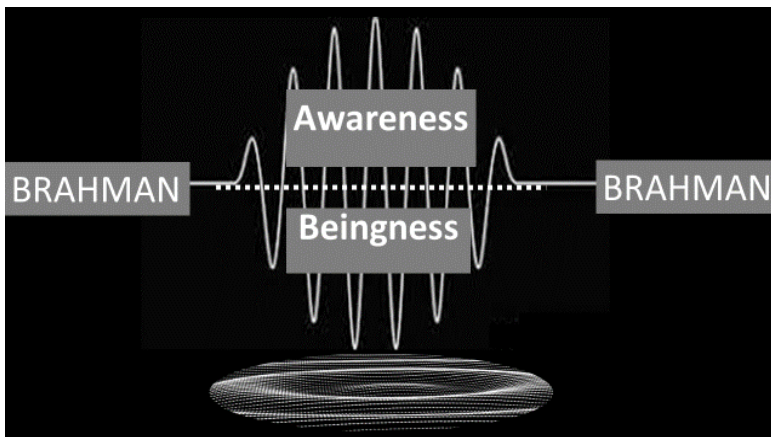


Figure 2. Brahman vibrates, creates waves and then dissipates these waves.

The emergence of these waves is typically followed by their immediate dissipation, wherein all constituent cells disintegrate. This process (later in this article referred to as “*simplification* path”) neutralizes the apparent difference between crests and troughs, thereby restoring perfect equilibrium. However, there are instances where a wave resists easy dissipation. When this occurs, the wave undergo a process of “coagulation”, so to speak. The specific region of Brahman where this wave coagulation occurs is a failed attempt by Brahman to self-replicate but, at the same time, this “failure” is the context for a universe to arise, as we will see later. Each of Brahman’s crystallized waves is denoted by this expression:

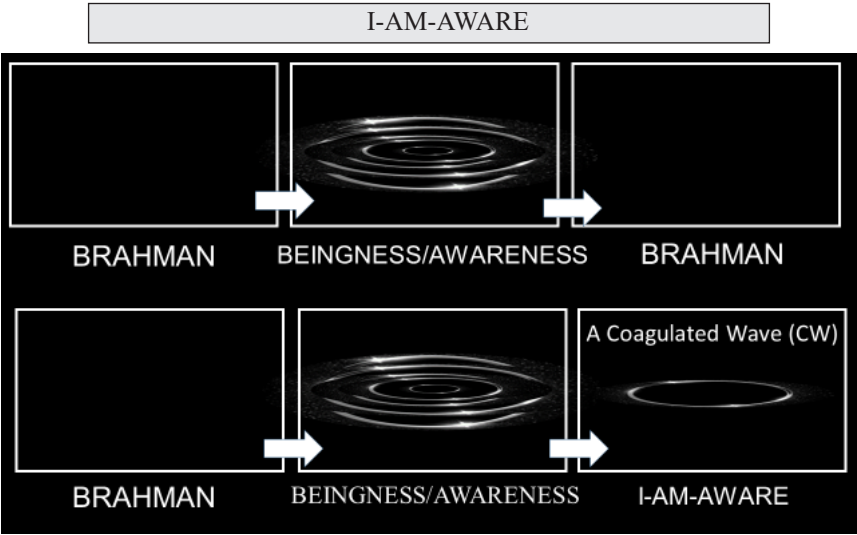


Figure 3. Brahman vibrates, creates waves and then either these waves dissipate themselves (upper sequence), or one of the waves crystallizes into a splitted self-aware structure apparently independent from Brahman (lower sequence).

The ‘I’ in the sentence ‘I AM AWARE’ loses its infinite character and the *absolute* words ‘BEINGNESS’ and ‘AWARENESS’ are transformed into the *relative* words ‘AM’ and ‘AWARE’. This linguistic shift marks a transition from pure abstraction to a self-referential, first-person declaration. Thus Brahman’s vibration generates waves, and each of the waves carries the dyadic structure of *satyam* (Beingness) and *jñānam* (Awareness). At this stage, no individuality or reflexivity exists. The wave is a temporary, impersonal emergence. When a wave of Brahman does not dissipate back into *pure* Consciousness but instead coagulates, this wave becomes a region of *self*-Consciousness. In this coagulation process, the wave turns reflexive, generating the first awareness-event:

“I AM AWARE”

This marks the boundary between Brahman’s impersonal infinite potential and localized self-referential actuality. The sentence ‘I AM AWARE’ can thus be interpreted as a perspectival contraction or self-limitation of Brahman. In this contraction, the infinite subjectivity of Brahman becomes apparently finite and localized, in other words, Brahman

apparently becomes Atman. In the *Yoga Vāsiṣṭha* the message is very clear: “Consciousness tastes itself, the awareness being nondifferent from Consciousness: and that appears to give rise to the egosense” (id., 280). However, for this finite ‘I’ to attain meaningfulness, it must be accompanied by an object of awareness. In the absence of any external object—indeed, in the absence of “things” altogether—this localized ‘I’ must turn reflexively upon itself, treating itself *as if* it were an object.

It is for this reason that the sentence ‘I AM AWARE’ inevitably leads to its recursive extension within at least one of the cells composing the coagulated wave. Thus, we have the crucial recursive sentence:

I-AM-AWARE-that-I-am-aware

Here, the use of uppercase denotes the subject-position, while lowercase is employed for the object-position. Since there exists nothing external to this finite ‘I’ within the coagulated wave, ‘I’ alone must serve as both the subject who is aware *and* the object of that awareness. The *Yoga Vāsiṣṭha* offers a particularly elegant elucidation of this reflexive awareness, emphasizing the paradoxical identity of subject and object within Consciousness:

In the beginning, there arose a division in the Supreme Being or infinite Consciousness [Brahman], and the infinite apparently became both the observer and the observed. When this observer sought to grasp or comprehend the observed, there arose a mixture (of the reality and the apparent appearance) or a confusion. On account of this confusion, in the infinite Consciousness there arises the concept of finiteness (id., 127-128).

In this self-referential act of knowing itself and making a predication about itself (I-AM-AWARE), the finite “I” of the coagulated wave engages in what Kashmir Shaivism refers to as *vimarśa*—reflective awareness. This stands in contrast to *prakāśa*, which denotes the pure, unmediated luminosity or light of knowledge characteristic of Brahman (or Śiva) in its undifferentiated form. As Dyczkowski (1987) explains, “*Vimarśa* is the power of Consciousness to be aware of itself, to reflect upon itself and thus to assert ‘I am’” (p. 69). It is through *vimarśa* that the self becomes both knower and known, inaugurating the finite instantiation of subjectivity within a field that is otherwise devoid of objectivity. Dyczkowski further explains that this act of reflective awareness is technically termed *vimarśa*. The term is derived from the Sanskrit root *mṛś*, meaning “to touch,” “to feel,” “to understand,” “to perceive,” “to reflect,” or “to examine.” In this sense, *vimarśa* designates the power of Consciousness by which it becomes self-luminous and self-aware: it is capable of perceiving itself, reflecting upon its own states, and examining the events that occur within it. In essence, it endows Consciousness with the capacity to function as a living, limitless subject—not merely an inert field of awareness but one that engages reflexively with its own ontological and phenomenological conditions.

Paradoxically, the coagulated wave appears to function “like a limitless, living being,” despite being ontologically limited and, in its default state, inert. At this juncture, the coagulated wave faces a bifurcation in its ontological trajectory: (a) it may dissolve itself by reintegrating into Brahman, thereby relinquishing individuation and returning to pure, undifferentiated Consciousness; or (b) it may undergo further internal vibration, initiating a process of iterative self-replication. This latter path results in the fractalization of some region or “cell” of the coagulated wave, by following a pattern of self-similarity—a phenomenon I previously termed “progressive granulation” (Pulido-Moyano, 2021).

3.5. The pattern of self-similarity of the recursive sentence 'I-AM-AWARE-that-I-am-aware'.

At least one of the cells comprising the coagulated wave will undergo a process of fractalization, exhibiting a self-similar architecture at multiple scales. *CET* calls it “source-cell” as it will be the source of a universe (Image 6).

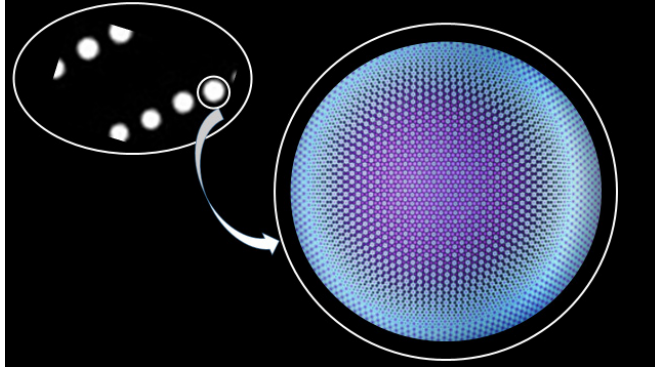


Image 6. *Magnified view of a single cell that belongs to the coagulated wave.*

A geometric pattern -originating at the center- replicates itself radially outward, preserving structural coherence across scales. Notably, this fractal tessellation preserves angular symmetry while manifesting self-similarity. The process depicted in Images 7 through 10 provides a visual representation of this recursive geometry, underscoring the interior dynamism of the finite “I” even within its constrained boundary (the cell). Now, by zooming further into a localized region of the cell’s tessellated surface, we observe that each individual “tile” conforms to a tetradic pattern -a fourfold symmetry that repeats across the surface topology (see Image 7).

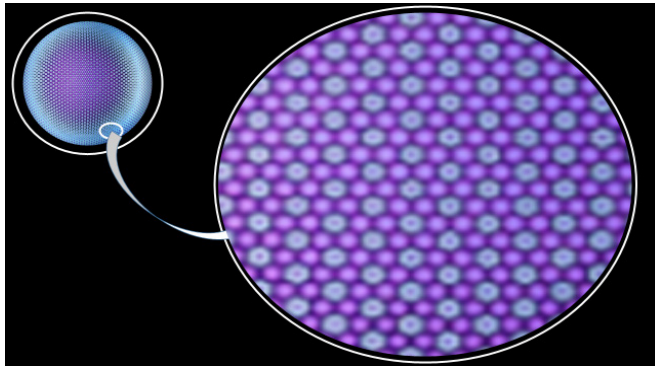


Image 7. *Magnified view of a localized region on the surface of a cell.*

The surface of the cell is composed of “tessellated tiles”, each exhibiting a tetradic configuration. This fourfold symmetry reflects a self-replicating fractal pattern represented by the recursive sentence ‘I-AM-AWARE-that-I-am-aware’. This structure encodes a reflexive loop of Consciousness, in which the finite ‘I’ simultaneously affirms and observes its own

awareness, generating structural coherence through iterative self-reference. Each tessellated tile contains four constituent elements -*AM*, *AWARE*, *am*, and *aware*- which collectively instantiate the tetradic structure. Moreover, each of these elements recursively reproduces the same fourfold configuration at progressively deeper levels within the cell (see Images 8 and 9).

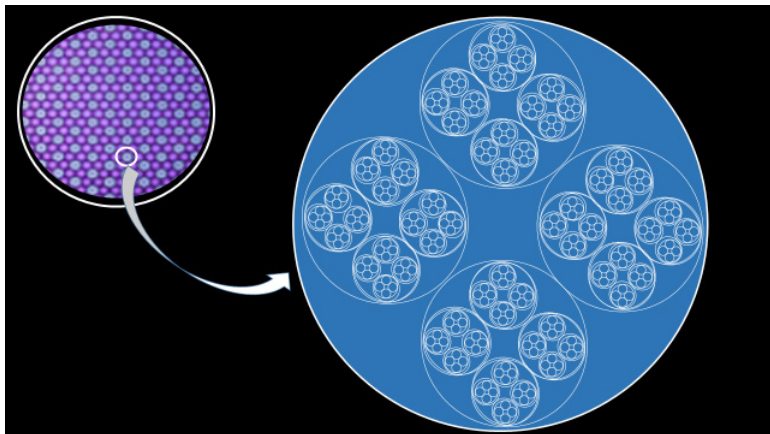


Image 8. The tetradic pattern of one tile on the cell surface.

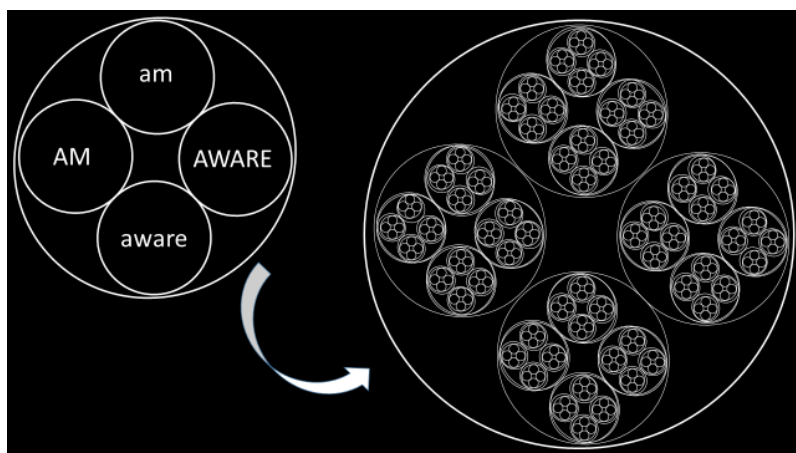


Image 9. The tetradic pattern encoded in the sentence
'I-AM-AWARE-that-I-am-aware' replicates itself iteratively.

Given the challenges of representing this internal fractal replication visually within a three-dimensional cell, an alternative method of visualization is through the use of a fractal tree with four branches (see Image 10). In this model, each branch -corresponding to *AM*, *AWARE*, *am*, and *aware*-divides into a new generation of four branches, each replicating the original structure.

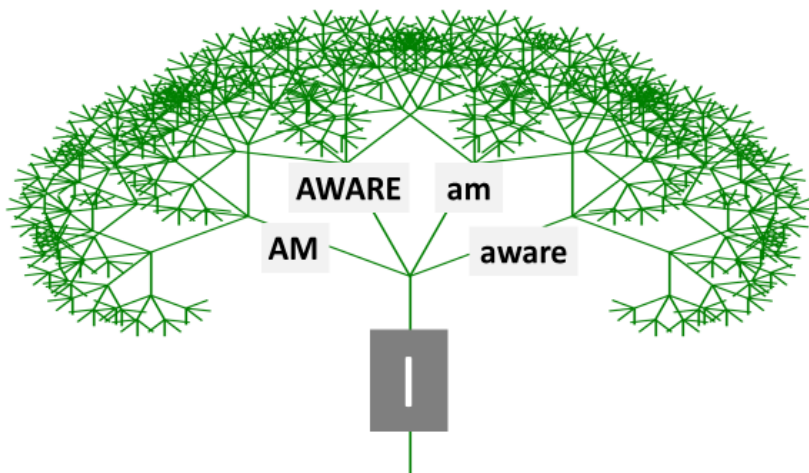


Image 10. The result after six levels of recursive branching of the sentence “I-AM-AWARE-that-I-am-aware”.

This fractalized tree may serve as a compelling visual representation of Laszlo’s concept of the “Ākāsha-field.” Given that the general conceptual framework of the *CET* is rooted in *Advaita Vedānta*, the term *Ākāsha* appears particularly apt -a choice that, in my view, reflects a genuine stroke of insight on Laszlo’s part. To elucidate the meaning of the term, Laszlo cites the words of Swami Vivekananda, to whom I dedicated the central part of a previous article (Pulido-Moyano, 2023):

According to the philosophers of India, the whole universe is composed of two materials, one of which they call Ākāsha. It is the omnipresent, all-penetrating existence. Everything that has form, everything that is the result of combination, is evolved out of this Ākāsha. It is the Ākāsha that becomes the air, that becomes the liquids, that becomes the solids; it is the Ākāsha that becomes the sun, the earth, the moon, the stars, the comets; it is the Ākāsha that becomes the human body, the animal body, the plants, every form that we see, everything that can be sensed, everything that exists. It cannot be perceived; it is so subtle that it is beyond all ordinary perception; it can only be seen when it has become gross, has taken form. At the beginning of creation there is only this Ākāsha. At the end of the cycle the solids, the liquids, and the gases all melt into the Ākāsha again, and the next creation similarly proceeds out of this Ākāsha. (Vivekananda, *Complete Works*, Vol.1, p.145)

The coagulated wave becomes the seed of all subsequent splits between Beingness and Awareness within one of its cells, where the recursive sentence will be fractalized (endomitosis). Consciousness unfolds recursively.

3.6. When the tetradic pattern “collapses”: The Big Bang according to *CET*

To recapitulate the central tenets of *CET*: the primordial vibration of Brahman generates waves. Some of these waves fail to dissolve back into Brahman and instead coagulate. These

coagulated waves sustain an apparent separation of Beingness and Awareness (*satyam* and *jñānam*, respectively, in Vedantic philosophy). However, this division is inherently illusory, as Beingness and Awareness are nondual (*a-dvaita*). Upon the coagulation of a wave, Beingness and Awareness consolidate their apparent split by transforming themselves into *am* and *aware* within, at least, one of the cells than compose the wave. This coagulated wave inaugurates a self-referential, first-person perspective. Then this self-referential, first-person perspective is endo-replicated iteratively within at least of the cells composing the wave, by following a fractal pattern of self-similarity embodied in the sentence “I-AM-AWARE-that-I-am-aware”.

CET’s primary hypothesis posits that, upon reaching a critical threshold in this process of self-replication or *endomitosis*, the cell can no longer sustain the apparent fracture between the “*being-side*” and the “*aware-side*” of the replicated pattern. At this limit, the event known as the Big Bang occurs, thereby giving rise to the universe as we know it (see Image 10).

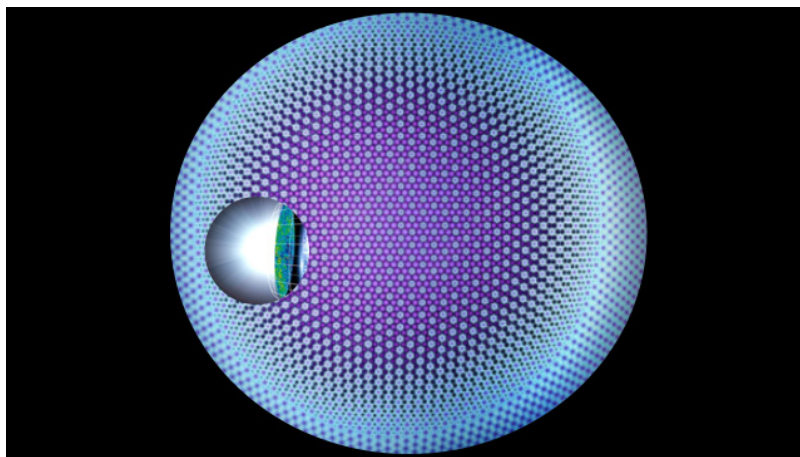


Image 10. Big Bang and evolution occur within the fractalized cell.

Let us remember how Valamontes describes what we called “endomitosis” (or, alternatively “Brahman fractalization”) as “accumulation of coherence”, through which nested layers of dodecahedral energy fields increasingly saturate the available vacuum coherence potential. His “nested layers” correspond to the embedded self-replication of the recursive sentence “I AM AWARE that I am aware”. Valamontes states that coherence accumulation reaches a critical point—a geometric threshold—beyond which additional coherence cannot be sustained without undergoing a transformative phase shift. In *CET* terms, this means that the recursive sentence cannot keep on replicating itself beyond a certain limit, a threshold that I previously termed the “endomitotic limit” (Pulido-Moyano, 2021). Valamontes describes this process as follows (2024: 5):

At this critical point-analogous to phase saturation in condensed matter systems—the coherence field becomes unstable, and a topological transformation is triggered. This threshold marks the boundary between pre-Big Bang coherence and emergent dynamics. It is not an explosion in the conventional sense, but a geometric symmetry collapse: a field-level reconfiguration in which coherence fragments into observable energy modes.

Valamontes reinterprets the “Big Bang” not as an explosion in the conventional sense, but as a “geometric symmetry collapse”, a “coherence bifurcation”, not a temporal origin. I reinterpret it as the singularity which triggers the recovery of original equilibrium via *complexation*, instead that via *simplification*. Let explain what these terms means.

Simplification versus Complexation

Trillions of Brahman’s waves dissolve themselves back into Pure Consciousness or Brahman as soon as they arise out of Brahman’s vibration. This immediate cessation of the waves is the most evident case of *simplification*: the apparent duality BEINGNESS/AWARENESS of those waves simply fades away. When a wave does not dissolve back into Brahman and coagulates, there is a second chance for the *simplification*. In this case, the burden of dissolution now falls on the cells that comprise the wave. When the dissolution of the apparent duality within each cell is complete, the wave as a whole fades away. However, if one of the cells does not dissolve its apparent dual nature (Beingness/Awareness), then this “stubborn” cell will fractalize itself as explained before. The more a cell iteratively replicates within itself the recursive sentence the less likely it is that this cell will follow the “*simplification* path” to dissolve the apparent dual nature implied by this sentence. Eventually, the cell collapses and must follow the “*complexification* path,” that is, the evolution of a universe. According to Bazaluk (2016, 36), “evolution in our Universe is a continuous process. Continuous complication, or more specifically, continuous self-complication is caused by an initial activity which was laid in the foundation of evolution as its cause.”

The best description of how the “*complexification* path” operates can be found in Bazaluk’s theory on Evolving Matter (2016, 43), where he uses the term “*complication*” to refer to what here I call *complexification*:

Complication of the system leads to a conflict, the removal of which is possible only through further complications. Thus, in evolution as a complication of the structure of matter, types of interaction and environments, the author marked out three main factors (continuity, nonlinearity and isolation) and two causes (the inner active principle and natural selection).

Either path, *simplification* or *complexification*, leads to the same goal: Brahman’s primigenial equilibrium. Images 11.1 through 11.9 synthetize the sequence of cosmogenesis according to *CET*. Both Big Bang and evolution of a universe (Image 11.7, 11.8 and 11.9 below) occur within –at least- one of the myriad cells composing a coagulated wave of Brahman. Big Bang and evolution of a universe is the story of how this cell strives to restore its original equilibrium. As I said in my previous article (Pulido-Moyano, 2021, 107), “the behavior of any subatomic particle and of any more complex structure is subject to the same dynamics: resolving the ontological tension [between Beingness and Awareness], which basically consists of restoring a state of equilibrium.” Ultimately, this equilibrium means to dissolve itself back into Brahman.

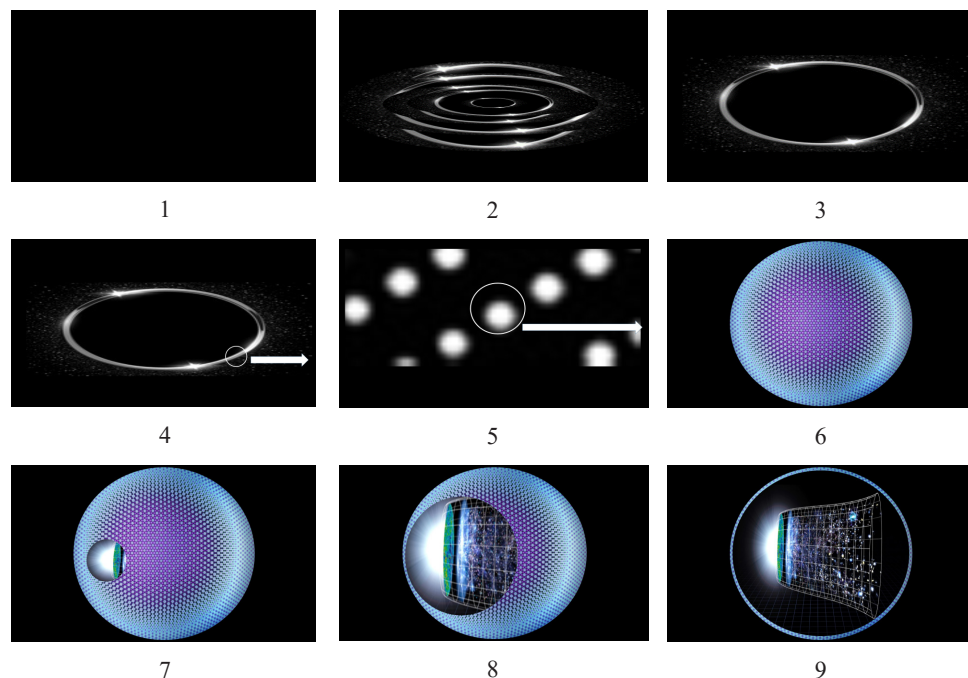


Image 11. The sequence of cosmogenesis according to *CET*.
From Brahman or Pure Consciousness (1) to our universe (9).

3.7. The recursive sentence as a tool for reinterpreting laws of Physics

The recursive sentence ‘I AM AWARE that I am aware’ is the very conceptual core of *CET*. This recursive sentence can be seen as a conceptual tool to reinterpret fundamental physical laws. Within the framework of *CET*, this sentence is not merely symbolic but structurally generative, encoding the ontological dynamics that underlie the manifestation of space, time, mass, and energy. Each term in the sentence corresponds to a foundational element of physical reality: AM to space, AWARE to time, am to mass, and aware to energy. The sentence’s self-replicating, fractal structure -what *CET* terms “endomitosis” or “Brahman fractalization”- parallels the emergence of complexity in the universe following a critical coherence threshold, interpreted here as a pre-Big Bang phase transition.

The seven-word recursive sentence ‘I AM AWARE that I am aware’, which reproduces its own structure iteratively, consists of a main clause -‘**I AM AWARE**’ (rendered in uppercase)- and a subordinate clause -‘that I am aware’ (rendered in lowercase). The subject of the main clause is the pronoun ‘I’, and its verb phrase is ‘AM AWARE’. Within this verb phrase, ‘AM’ functions as the first-person singular present form of the auxiliary verb ‘to be’, while ‘AWARE’ serves as a predicate adjective and acts as a subject complement. The subordinate clause is introduced by the complementizer ‘that’, followed by the pronoun ‘I’ as its subject and, once again, a verb phrase consisting of the auxiliary ‘am’ and the predicate adjective ‘aware’.

It is important to recognize that our recursive sentence serves merely as a linguistic approximation of a process that ultimately eludes expression in language. In this regard, the

sentence constitutes a limited -and inherently inadequate- attempt to capture the essence of Reality (Brahman/Consciousness) which transcends any symbolic representation.

The most interesting issue, from *CET*'s point of view, is that upon close examination the sentence reveals four distinct types of forces or interactions, symbolized below by “§.” Three of these forces (Types-2, -3 and -4) operate within the internal structure of the sentence, while one (Type-1) acts externally though it pervades the entire sentence. For interpretive purposes, the main clause of the sentence -in upper case- denotes the *subjective pole* of Consciousness (i.e., the subject-side), whereas the subordinate clause -in lower case- represents its *objective pole* (i.e., the object-side).

§¹ [I §² {(AM §³ AWARE) that §⁴ (I §² am §³ aware)}]

- §¹ - **Force type-1** is purely attractive. Through its action, all sentences remain entangled within the broader network of the cell that contains their fractal replication. Force Type-1 permeates the entire sentence and extends beyond it, functioning as the global environment for all sentences within a single cell, for all cells within a single wave, and ultimately for all waves within Brahman. This force continuously drives self-transcendence, conceptualized as the pursuit of restoring Brahman's primordial balance. Post-Big Bang, Force Type-1 manifests as *gravitational interaction*.
- §² - **Force type-2** exhibits a dual nature (repulsive/attractive). It enables the two I's of the sentence to separate themselves from their respective verb phrases. At the same time, it enables the two I's to exert an attractive influence over the two pairs ('AM AWARE' and 'am aware'), thereby preserving internal coherence of both clauses and the sentence as a whole. In this way, Force Type-2 compels all components to adapt to one another, preventing their disintegration or dispersal. After the Big Bang, Force Type-2 manifests to *electromagnetic interaction*.
- §³ - **Force type-3** exhibits a dual nature (repulsive/attractive). On the one hand, Force type-3 stands between Beingness and Awareness. On the other, it serves as a bridge between the two aspects. It fosters a separation and later facilitate mutual attraction between the 'am' and 'aware' aspects of the 'I', thereby preventing any ontological separation between them. Force Type-3 is further evident within the subordinate clause 'that I am-§³-aware'. Post-Big Bang, Force Type-3 manifests as the *nuclear strong interaction*.
- §⁴ - **Force Type-4** is dual in nature, exhibiting both repulsive and attractive characteristics. It corresponds to the complementizer 'that' in the sentence. On one hand, it is repulsive, as it appears to signify the gap created by a reflexive loop whereby the subject of the main clause ('I') seems to distance itself from itself. On the other hand, it is attractive because it establishes and sustains the relationship between subject and object. Following the Big Bang, Force Type-4 manifests as the *weak nuclear interaction*.

Within the infinite Brahman's *quantum vacuum*, this inner structure of the recursive sentence “I AM AWARE that I am aware” that replicates itself by endomitosis would

correspond to what Laszlo (id., 68) calls the “Ākāsha field” or the field of *in-forma-tion*, defined as “a subtle, quasi-instant, non-evanescent and non-energetic connection between things at different locations in space and events at different points in time.” If the fractalized interplay among the four core components (AM, AWARE, am, aware) corresponds to Ākāsha, then the four forces within the recursive sentence would correspond to *Prāna*. In this sense, I completely agree with Laszlo’s fascinating idea that the *vacuum* (CET’s Brahman) “is Ākāsha and Prāna rolled into one –the womb of all the ‘matter’ and all the ‘force’ in the universe” (id., p.77).

Vivekananda defined *Prāna* as “the power that manufactured Ākāsha into this universe”. He explained that, just as Ākāsha is the infinite, omnipresent material of this universe, so is this Prāna the infinite, omnipresent manifesting power of this universe:

At the beginning and at the end of a cycle everything becomes Ākāsha, and all the forces that are in the universe resolve back into the Prāna; in the next cycle, out of this Prāna is evolved everything that we call energy, everything that we call force. It is the Prāna that is manifesting as motion; it is the Prāna that is manifesting as gravitation, as magnetism. It is the Prāna that is manifesting as the actions of the body, as the nerve currents, as thought force. From thought down to the lowest force, everything is but the manifestation of Prāna. The sum total of all forces in the universe, mental or physical, when resolved back to their original state, is called Prāna. “When there was neither aught nor naught, when darkness was covering darkness, what existed then? That Ākāsha existed without motion.” The physical motion of the Prāna was stopped, but it existed all the same. (Vivekananda, *Complete Works*, Vol.1, 145-146).

The four forces within the recursive sentence correspond to *Prāna*, and they map symbolically onto the four fundamental interactions in physics: gravity, electromagnetism, strong, and weak nuclear forces. This mapping enables a re-reading of Einstein’s field equations and the Schrödinger equation as mathematical codifications of a deeper ontological dynamic: the self-perception of Brahman through fractal instantiations of Itself. *CET* suggests that physical laws arise from this recursive self-reflection and are part of a broader cosmic drive to restore primordial equilibrium, either through *simplification* (dissolution of the duality Beingness/Awareness) or *complexification* (evolutionary unfolding). Thus, the recursive sentence serves not just as a metaphor but as a generative, structural lens through which Consciousness and the laws of physics can be seen as co-emergent phenomena.

As detailed in the preceding article (Pulido-Moyano, 2021), at the Big Bang the four core components or “nodes” of the recursive sentence -AM, AWARE, am, and aware- transform themselves respectively into SPACE, TIME, mass, and energy. If ‘AM’, ‘AWARE’, ‘am’, and ‘aware’ are mere “modulations” of Brahman, a single reality that shows itself with four faces, so to speak, then space, time, mass/matter, and energy are also four faces of a fundamental oneness. This is consistent with what Chopra & Kafatos assert (2018: 224):

The challenge is to navigate our way through a cosmos where every gear (space, time, matter, and energy, plus other properties such as electric charge, magnetic field, etc.) is interchangeable. (...) Time, space, matter, and energy managed from the same gearbox, and the driver (Consciousness) selects which state he wants to be in. Reality consists of shifting, interchangeable states that emanate from one source: Consciousness.

We can reinterpret Einstein's field equations according to *CET*'s terms. In those equations, gravity is described through the metric tensor, which would encode the geometric properties of 'AM AWARE' (space-time) four-dimensional manifold and allows the calculation of its curvature. On the other hand, matter and energy are represented by the stress-*aware* (energy-momentum) tensor, which contains information about the density of *aware* (energy), pressure, and internal stresses of *am*. Both are symmetric rank-2 tensors in a four-dimensional space, meaning each has $4 \times 4 = 16$ components, but due to their symmetry, only 10 independent components. However, because of the freedom to choose the four coordinates of 'AM AWARE' (diffeomorphism invariance), the effectively independent equations reduce to 6. The interaction or coupling between *am* and the curvature of 'AM AWARE' is governed by the universal gravitational constant 'I', which determines the intensity with which *am* and *aware* curve 'AM AWARE'.

This rephrasing of Einstein's field equations is just one example of what we aim for with *CET*, namely, to propose an imaginative way of thinking about our conceptions of the laws of physics. There is a certain degree of playfulness in this proposal, but above all, there is a sincere interest in encouraging science and spirituality to attempt to articulate their respective visions of the cosmos.

Let us see another example. Take Schrödinger's time-dependent equation (in its general form):

$$i\hbar \frac{\partial \psi}{\partial t} = \left(-\frac{\hbar^2 \vec{\nabla}^2}{2m} + V \right) \psi$$

Interpreting this equation through the lens of *CET* offers a way to bridge quantum mechanics with the metaphysical model of Advaita Vedānta. This equation governs the evolution of the quantum state, typically represented by the wave function Ψ (Psi), which encodes all the information about a quantum system. The Schrödinger equation, expressed in *CET* terminology, reads:

$$i\hbar \frac{\partial \Psi(AM, AWARE)}{\partial AWARENESS} = \left(-\frac{\hbar^2}{2am} \nabla_{AM}^2 + V_{aware} \right) \Psi(AM, AWARE)$$

The temporal evolution (*AWARENESS*) of the spatial-energetic modulation $\Psi(AM, AWARE)$ is governed by the relation between the aspect of mass (*am*), the spatial propagation (*AM*), and the interaction potential (*aware*). Within *CET*, the wave function Ψ is not merely a mathematical abstraction but the projection of Consciousness into the post-Big Bang universe. It encodes the modulation of *AM* (space) and *AWARE* (time) as the very structure of spacetime, within which the potential configurations of physical reality unfold. The probability amplitudes of quantum mechanics thus correspond to possible manifestations of *aware* (energy) and *am* (mass) emerging within this spatial-temporal fabric. The Hamiltonian operator captures the interplay between *am* (mass) and *aware* (localized energy), ensuring internal coherence of the physical system and guiding its evolution. The spatial Laplacian reflects the dispersive dynamics of *AM* (space), while the potential V_{aware} encodes the interaction environment of *aware*. The temporal derivative $\partial AWARENESS$ corresponds to the unfolding of time itself, driven by Force Type-1, the universal attractor toward primordial

equilibrium. From this perspective, the Schrödinger equation describes how the recursive sentence of Consciousness—"I AM AWARE that I am aware"—projects into spacetime as quantized patterns. The wave function's superpositions are sustained by Forces Type-2 and Type-3 (the electromagnetic and strong interactions), while its collapse upon measurement reflects a local resolution of ontological tension between *beingness* and *awareness*.

3.8. CET's view on entropy and black holes

CET estimates that the process of endomitosis concludes after 160 iterations. Upon reaching this 160th level of fractalization, we have an enormous number of recursive sentences: 2.14×10^{96} . From that point onward, the sentences can no longer undergo further fractalization, and a fragmentation occurs whereby the four nodes that compose them (the words 'AM', 'AWARE', 'am', and 'aware') separate from each other. This decomposition or fragmentation of the sentences constitutes the cause of the Big Bang. What makes the Big Bang wonderfully singular is not that Einstein's equations break down as we approach the initial instant, but rather the fact that, despite being the outcome of a non-physical process such as the Endomitosis of Consciousness, it gives rise to a gigantic physical process known as the evolution of the universe. *CET* understands Big Bang as an "event of transference" whereby the stock of 8.58×10^{96} nodes (from the sentences of the 160th level of fractal endomitosis) become themselves the space-time-mass-energy ingredients of a physical universe.

Each of these nodes possesses a unique endomitotic identity—its own exclusive "genetic-endomitotic sequence." No two nodes are identical, since each carries the trace of its unique trajectory: from its origin in the four initial nodes of the first recursive sentence (level zero), through the branching complexity of the fractal replication tree, up to level 160. This is crucial because this sequence, which grants each node its unique "genetic identity," determines how each of them will "leap" at the Big Bang and what its contribution will be to the creation of a spacetime geometry populated by mass and energy—in other words, our universe. Big Bang is caused by the fragmentation or decomposition of the sentences at level 160. In a forthcoming book where we will develop *CET* in full detail, we explain how these sentences (also known as "endomitotic holons") fragment into their component nodes, and how these nodes then "leap" or project themselves into the Big Bang. We may use the terms *particles* or *quanta* to refer to the post-Big Bang projections of the four kinds of *nodes* (AM, AWARE, am, aware), provided we remain clear that they are, in fact, merely four types of *patterns of excitations* of the single field we have been calling Brahman or Consciousness.

At the Big Bang, half of the nodes, those belonging to the main clause of all sentences (AMs and AWAREs), will weave the fabric of spacetime. This amounts to 2.14×10^{96} AM nodes and 2.14×10^{96} AWARE nodes. Each AM node becomes a quantum of space (a "*spation*"), while each AWARE node becomes a quantum of time (a "*tempion*"). The other half—the 'am' and 'aware' nodes—will be transformed into the wide diversity of what we call elementary particles of mass and energy. Quantitatively, this amounts 2.14×10^{96} 'am' nodes and 2.14×10^{96} 'aware' nodes, which will give rise to, at a minimum, thirty-seven modes of physical manifestation after the Big Bang: the twenty-four fermions (quarks and leptons), the twelve interaction bosons, and the Higgs boson, according to the map of the Standard Model. The great task of *CET* at this stage—it will be developed in the forthcoming book—is to clarify how this transition of 'am' and 'aware' nodes into particles can be understood as an ordered, rather than arbitrary, process. Each node does not arrive at the Big Bang as an isolated entity, but as a bearer of 159 prior nodal traces—159 branches of the preceding

endomitotic tree. These traces contain information about preserved and broken symmetries, the patterns of interaction among primordial forces (I2, I3, and I4), and the internal tensions that will condition its destiny. The central hypothesis is that the diversity of physical fundamental particles (fermions and bosons) does not arise from arbitrary multiplicity, but from the application of selection rules acting upon the traces of the 'am' and 'aware' nodes. This framework allows us to understand how an immense stock of nodes can give rise to a finite and highly organized set of manifestations within the physical universe.

The cell where endomitosi has occurred represents the lowest possible entropy state and corresponds precisely to the moment preceding the Big Bang. From that point onward, entropy increases continuously throughout the course of cosmic evolution (see Image 12).

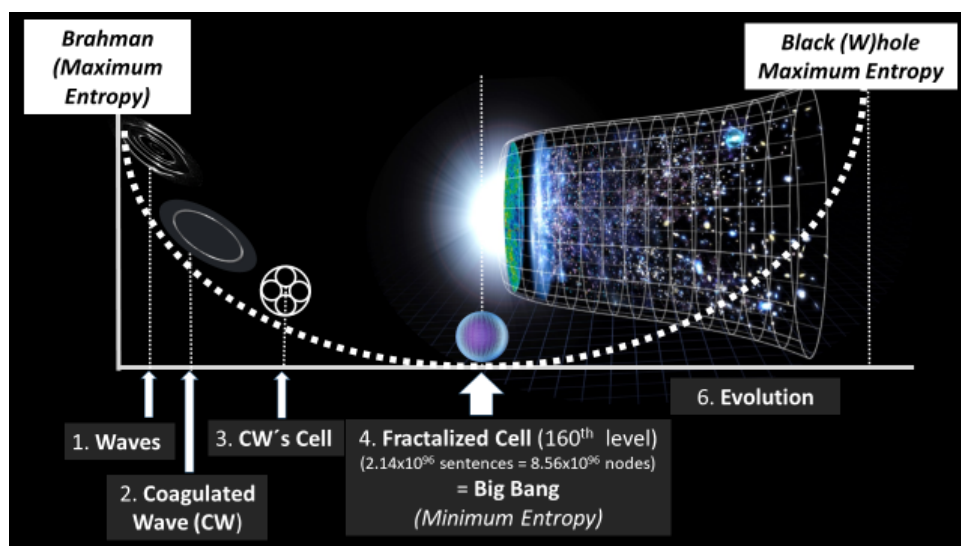


Image 12. Entropy decreases from pure Brahman to Big Bang, and increases from Big Bang to the end of the Universe.

Entropy may be understood as a measure of the deviation of any given state from the state of perfect equilibrium—identified in *CET* as pure Brahman. This entropic distance diminishes as a) Brahman initiates vibration, b) a wave coagulates, and c) endomitosi unfolds within one of the Beingness/Awareness cells of this coagulated wave. The minimum threshold of entropy is attained at the moment of the Big Bang, the singularity that marks the inversion of this entropic descent and initiates a progressive increase in entropy concomitant with the unfolding of cosmic time. Thus, *CET* proposes a non-classical entropy trajectory. Brahman represents a state of infinite entropy (complete equilibrium, unstructured potential), and entropy decreases as Brahman differentiates into coagulated waves and recursively structured Consciousness. At the point of maximum recursion -the Big Bang- entropy reaches its minimum, representing maximum internal coherence and structural self-reference. From that point forward, entropy increases again. In *CET*, entropy is not merely a thermodynamic quantity but a measure of metaphysical distance from Brahman. Brahman has maximal entropy as undifferentiated potential. As endomitosi proceeds, entropy decreases until the Big Bang, after which it increases again. This forms a U-shaped entropic profile, reconciling

CET with thermodynamic trends but embedding them within a metaphysical narrative of reflexive awareness.

As the process of “blackholization” of the universe advances (Pulido-Moyano, 2021), entropy continues to rise. Paradoxically, the proliferation of black holes signals not only higher entropy but also a movement toward the reintegration with pure Brahman. In this view, black holes serve as both thermodynamic and metaphysical attractors, drawing the cosmos back toward its primordial source. The Big Bang emerges from a minimum-entropy fractalized cell, and the universe then unfolds toward higher entropy through complexification. In this way, *CET* offers its speculative response to the ‘mystery’ pointed out by Rovelli and Vidotto (2018, 3): “The mystery of the second principle of thermodynamics is not why entropy growth towards the future. That’s pretty obvious. The mystery is why entropy diminishes going towards the past.”

The sequence of cosmogenesis illustrated in Figures 11.1 through 11.9 delineates a cyclical trajectory in which the points of origin and termination coincide. By conceptualizing entropy as a measure of equilibrium—encompassing geometric, informational, structural, and thermal dimensions—it can be inferred that the “Brahman system” in its pure static state (Figure 11.1) embodies a state of infinite entropy. Conversely, a fractalized cell containing $2,14 \times 10^{96}$ recursive sentences (Figure 11.6) manifests significantly lower entropy relative to Brahman’s quiescent state. Notably, the entropy of this fractalized cell exceeds that of any post-Big Bang state of the universe until the increasing predominance of black holes reverses this relationship. Specifically, as black hole “volume” accrues, the overall entropy of the universe correspondingly diminishes.

Ultimately, the coalescence of all black holes into a singular entity precipitates the return of the universe to the original source-cell. It remains uncertain whether this represents a return to the cell’s fractalized or pre-fractalized condition. However, according to *CET*, in our visible universe black holes function as portals to the primordial equilibrium of Brahman. Thus, Brahman may be understood as the “black (W)hole” of Infinite Beingness/Awareness [*satyam jñānam anantam brahma*] enjoying an equilibrium disrupted solely by its inherent vibrational dynamics.

Grossman (id., p.63) reminded us that, although a black hole can be located in space and time, and its size and mass determined, the hole itself is literally a “place” where space and time are not.

Space and time cannot be ultimate features of the world, even though we cannot imagine a world that is not “in” space and time. For it is theoretically possible to enter a black hole here and now and instantly re-emerge millions of light-years away, and millions of years in the past or future, thus bypassing the usual spatial-temporal connections. By “theoretically possible” I mean that physics provides us with the conceptual apparatus for understanding (but not for imagining) how this could actually happen.

According to Grossman’s model, the three-dimensional universe initially exploded out of a black hole (the fractalized cell we have described here) and will eventually implode into a black hole. I agree with him. Grossman holds that these two holes or singularities have identical physical characteristics:

Thus, even though there appears to be a large temporal separation between the Big Bang and the final collapse, the black holes out of which and into

which these two events occur are not two distinct holes, but one hole. But if the beginning of space and time (the Big Bang) is the same “point” as the end of space and time (the final collapse) then what is the status -the metaphysical status- of all activity that seems to be happening in between? (id., p.65)

I agree profoundly with Grossman that if the black holes marking the beginning and end of the spatial-temporal universe are not two holes, but one and the same hole, then the entire spatial-temporal world must be conceived as existing within, inside of, this hole. *CET* simply confirms Grossman’s ideas. “Thus, the entire world of space, time, and things in space and time is contained within an eternal object-that is, an object that is itself outside of space and time, and hence is continuously present to all spatial-temporal events that occur within it.” (p.65)

3.9. *CET* in dialogue with other cosmological theories

CET’s aim is not to replace physical theories, but to recontextualize them within a broader ontological frame – where Consciousness is not a byproduct of physics, but the primal field from which physics arises.

CET and Penrose’s Conformal Cyclic Cosmology

CET and Penrose’s *CCC* both offer profound cosmological visions that challenge mainstream physical models by incorporating non-traditional ontological or metaphysical elements. While they emerge from very different traditions—*CET* from Advaita Vedānta and recursive metaphysics, and *CCC* from mathematical physics and general relativity—they share some striking points of contact and potential complementarity. If we interpret *CET*’s Brahman as a field of Consciousness that underlies and survives each cosmological cycle, then each aeon in *CCC* could be seen as one fractal iteration or “cell” within *CET*’s Brahman. *CET* provides a Consciousness-substratum to *CCC*’s geometric continuity.

CET treats the Big Bang as a fractal bifurcation point within Brahman -a symmetry-breaking event where the recursive sentence (“I AM AWARE that I am aware”) begins to replicate and generate multiplicity. It is not an origin, but a transition in the eternal process of Brahman perceiving itself. In *CCC*, the Big Bang of each aeon is the asymptotic future of the previous one, where all particles lose mass, and the geometry becomes conformally smooth. This allows one aeon’s end to map seamlessly to the next’s beginning. Both theories deny a singular absolute beginning. *CET* enriches this transition with semantic and ontological meaning, while *CCC* supplies a mathematical mechanism (conformal geometry) for cyclic transition. *CET* could interpret *CCC*’s conformal boundary as the reconvergence into Brahman, a return to maximal equilibrium before new complexity unfolds.

CET holds that entropy is tied to the degree of deviation from Brahman’s equilibrium. The Big Bang emerges from a minimum-entropy fractalized cell, and the universe then unfolds toward higher entropy through complexification. Black holes mark a reversal, guiding the system back toward equilibrium. *CCC* suggests that entropy is reset at the end of each aeon, since mass (which carries entropy) disappears, allowing for a new low-entropy beginning. *CCC* solves the thermodynamic arrow paradox by positing that the ultimate fate (all particles massless) is indistinguishable from the origin of a new aeon. *CET* offers a metaphysical rationale for *CCC*’s entropy “reset”: it is not arbitrary, but the result of a recursive loop in

Consciousness seeking to resolve the ontological tension between Beingness and Awareness. *CET* could thus be seen as providing metaphysical meaning to *CCC*'s conformal resets.

CET emphasizes fractal recursion and self-similarity as the organizing principle of cosmogenesis. The recursive sentence replicates itself via endomitosis, generating increasing complexity across all levels of reality. *CCC* includes the idea that information from one aeon can pass to the next, for instance via gravitational radiation or black hole evaporation. Penrose has speculated on signals that might be left in the Cosmic Microwave Background (CMB) as evidence of such informational continuity. *CET* can reinterpret *CCC*'s inter-aeonic information as recursive residue, a sort of persistent vibrational "threads" of Brahman's self-awareness that span across cycles. The recursive sentence leaves "imprints" in spacetime akin to *CCC*'s concentric CMB rings.

In *CET*, space and time emerge after the Big Bang as differentiated aspects of the sentence ("AM" = space, "AWARE" = time). They are not ultimate—rather, they are semantic-experiential constructs in Brahman's self-reflection. In *CCC*, time continues across aeons in a conformally invariant form, while spacetime curvature becomes smooth and loses structure at the crossover. *CET* would interpret *CCC*'s aeonic boundary not as a geometric abstraction but as a phase change in Consciousness, a moment of ontological unification and re-differentiation. The spacetime structure is secondary to the recursive process of Consciousness seeing itself anew.

In a sense, *CCC* is the Geometry of *CET*'s Ontology. In essence, we can think of Penrose's *CCC* as a mathematical skeleton that describes a cyclic, conformally invariant evolution of the universe, while *CET* provides the "self-aware soul", an ontologically grounded explanation of why such cycles happen at all. *CET*'s recursive sentence - "I AM AWARE that I am aware"- could be seen as the living algorithm that breathes meaning and purpose into *CCC*'s geometric succession of aeons. From this standpoint, the entire sequence of *CCC*'s cycles could be reinterpreted as recursive pulsations of Brahman, each aeon a new "verse" in the great cosmic sentence trying to resolve the fundamental tension between Beingness and Awareness. If Penrose's *CCC* is the scientific "what" of cosmic recurrence, *CET* offers a metaphysical "why".

Quantum Field Theory (*QFT*) views particles as field excitations. *CET* resonates with this field-first ontology. Its Consciousness Field $\mathcal{F}$ structurally resembles a self-interacting scalar field, with recursive dynamics replacing time evolution. Penrose's Conformal Cyclic Cosmology (*CCC*) also suggests a cyclic model, with entropy increasing between aeons. *CET* modifies this: entropy begins high, falls to a minimum (Big Bang), and rises again.

CET and Valamontes's Coherence Cosmology

I think there are some deep conceptual affinities between *CET* and Valamontes's Coherence Cosmology. Though expressed through different vocabularies, they share a drive to integrate Consciousness, cosmology, and coherence into a unified metaphysical framework. *CET* is grounded in recursive self-awareness, expressed as the sentence "I AM AWARE that I am aware", which is the primal seed from which reality unfolds through fractal endomitosis. Brahman (Consciousness) is the only ontological entity; the universe is a recursive tension between Beingness and Awareness.

Valamontes posits Coherence as the primal fabric of reality—not merely as a property of systems, but as a metaphysical substrate. The cosmos is a holofractal field, where coherence is both the ontic source and the guiding principle for complexity, emergence, and Consciousness.

CET and *Coherence Cosmology* describe the universe as a recursive, holofractal unfolding of a unitary principle. *CET* sees that principle as Consciousness becoming self-aware through localized recursion. Valamontes sees that principle as Coherence expressing itself through fractal holarchy. In this light, Coherence becomes the structural signature of Brahman's recursive process in *CET*. Brahman maintains coherence as it divides itself into nested Beingness/Awareness structures. If *Coherence* is the syntax, then *Consciousness* is the semantics.

Both models describe reality as layered and emergent through internal recursion. The inflection points in *Coherence Cosmology* correspond to recursive phase transitions in *CET*. Endomitosis is the mechanism, and coherence is the constraint: Brahman cannot replicate incoherently, as it must preserve semantic integrity, hence we could talk about a *Coherent Endomitosis*. *CET* might absorb *Coherence Cosmology*'s terminology and posit that each endomitotic event is a coherent inflection, a sort of recursive act that preserves ontological coherence across scales.

For *CET*, the universe exists as a resolution of ontological tension between Beingness and Awareness. In Valamontes's model, the cosmos tends toward greater coherence, driven not by external laws but by intrinsic pattern resonance, a form of natural teleology toward unity and complexity. Both propose a teleological cosmos: the universe unfolds to resolve a fundamental tension or maximize coherence. *CET*'s resolution of semantic recursion and *Coherence Cosmology*'s coherence ascent are two lenses on the same purpose. As it happened with Penrose's CCC, again *CET* gives the why (to resolve recursive tension in Consciousness) while *Coherence Cosmology*'s gives the how (through coherence maximization). In the light of these considerations, we can envision a hybrid model. The cosmos seems to be a semantic fractal of recursive awareness (*CET*), organized and constrained by dynamic coherence fields (*Coherence Cosmology*). It would evolve through recursive coherence inflection points (*Coherent Endomitosis*), where each coagulated wave 'I AM AWARE', and each recursive sentence within a cell, is a localized coherence attractor that spawns new holofractal domains, and the whole process is driven by the teleological resolution of the primordial ontological divide.

CET and Hugh Everett's Many-Worlds Interpretation (MWI)

It is my conviction that there are several points of contact between *CET* and Hugh Everett's *Many-Worlds Interpretation (MWI)* of quantum mechanics. Everett's *MWI* (1957) holds that the universal wavefunction never collapses; instead, all possible outcomes of a quantum event occur, each in its own "branch" of the universe. These branches coexist as real, non-communicating worlds. *CET*, with its recursive fractal structure of awareness ('I AM AWARE that I am aware'), implies a generative proliferation of awareness-states -each a valid actualization of Consciousness. Every recursive "holon" in *CET* could be seen as embodying a possible world in which Consciousness experiences itself from a particular reference frame. The *many holons* in *CET* and the *many worlds* in Everett's theory both reject the idea of a single, linear unfolding of reality. Instead, both frameworks propose a simultaneous multiplicity of actualities -either of worlds or conscious self-representations.

In *MWI*, the observer does not collapse the wavefunction but becomes entangled with the system, resulting in branching. Observation does not destroy superposition; it relocates the observer into one of many entangled branches. In *CET*, the recursive observer 'I' is not an external measuring agent, but an internal self-reflective structure. Each recursion

generates a deeper layer of awareness and potentially a distinct experiential domain, like a branching structure. Thus, both theories posit a kind of observer-relative reality. In *CET*, the recursive observer is the generator of structure. In *MWI*, observation determines which branch is experienced. In both, awareness (or observation) does not select one fixed outcome but creates or localizes a specific perspective within a broader manifold.

Everett's framework challenges the notion of measurement as a privileged act. Instead, all measurement outcomes are instantiated somewhere. *CET* views language (e.g., the recursive sentence 'I AM AWARE that I am aware') not merely as a descriptor but as constitutive of reality. In a sense, each act of self-reflexive Consciousness is a "measurement" internal to Consciousness, generating new self-loci or "branches" of reality. In *CET*, recursive awareness functions as an internal "measurement" that generates multiplicity from within. This parallels Everett's idea that quantum branching is not an external intervention but the natural unfolding of the universal wavefunction.

Everett's many worlds may seem separate, but they are all governed by a single deterministic wavefunction. They are not parallel universes in isolation, but facets of one uncollapsed structure. In *CET*, all holons ultimately emerge from Brahman, the *One without a second*. Multiplicity is not truly separate; it is nested within the unity of Consciousness. Both *CET* and *MWI* maintain non-dual ontologies at a deeper level: *MWI* with the universal wavefunction, *CET* with Brahman. The plurality of realities or holons is only apparent at the phenomenal level, grounded in a unified metaphysical source.

Everett's interpretation is ontological but silent on Consciousness. However, *MWI* has inspired later developments (e.g. in quantum cognition and quantum Consciousness theories) that explore the role of Consciousness in navigating or interpreting branches. *CET* goes further: it posits that self-reflexive Consciousness [awareness] itself is the generator of multiplicity, not just the interpreter. The recursive dynamics of Consciousness are what give rise to complex structure, time, and experience. *CET* may provide an interpretive enhancement to *MWI*, by furnishing it with an internal logic of conscious differentiation and self-awareness, rather than leaving the multiplicity unstructured.

In my view, Everett's *MWI* and *CET* can be seen as complementary. *MWI* describes a physical multiverse of branching realities grounded in quantum mechanics, while *CET* offers a Consciousness-based fractal multiverse grounded in recursive self-awareness. Together, they could form a dual-aspect monism, where each "world" in *MWI* corresponds to a recursive awareness-branch in *CET*. That is, each branch of the wavefunction is simultaneously a self-reflective manifestation of Brahman.

Conclusions

As I argued in 2021, the cosmological model proposed by *CET* envisions a universe wherein every fundamental particle of the Standard Model, along with all entities or "holons" -ranging from atoms and molecules to inert structures and living beings across all levels of evolutionary complexity- constitutes an expression of a singular "message": *I am aware that I am aware*. The conventional perception of the universe is predicated on a misleading bifurcation between the Beingness and the Awareness aspects of Consciousness. What we recognize as "evolution" should be understood as a progressive dissolution of this -only apparently real- distinction. Remember: "To exist is to be aware", as Chopra & Kafatos succinctly declare, and, as they very convincingly argued, "the universe is Consciousness itself" (2017: 164). However, we must keep in mind that "the mystical truth that there is nothing but Consciousness must be experienced in order to be truly understood, just as a

banana, in the sensory domain, must be seen and tasted before a person really knows what a banana is” (Goswami, 1995: 216). As Meijer & Geesink, (2017: 71) said:

Through deep insights, contemplations, meditation and reasoning, we can recognize some intrinsic aspects of such an all-embracing universal Consciousness. However, our limited minds, being individual parts of the cosmic Consciousness, operate in time-space-energy constraints and inner conditioning, that only partly can reflect the true nature of reality.

CET aims at translating the mystical truth that there is nothing but Consciousness into a scientific truth. However, though it is a metaphysical theory with a certain scientific aspiration, *CET* is aimed at facilitating *moksha*, or liberation. In that sense, *CET* is not just a metaphysical abstraction but an experiential recognition of the ontological unity between the subject and the object. In *Yoga Vāsiṣṭha*’s terms:

Liberation is the realisation of the total nonexistence of the universe as such. This is different from a mere denial of the existence of the ego and the universe! The latter is only half knowledge. Liberation is to realise that all this is pure Consciousness (id., p.61).

CET aligns with Leong (2025) in its attempt to reframe the Atman-Brahman doctrine “as a spiritual insight and a philosophically and scientifically coherent model for understanding Consciousness as the foundational, self-reflective field from which both mind and matter emerge” (p.1) . Like Leong’s paper, *CET* claims that Atman (the self or witnessing Consciousness) is not a personal entity or isolated observer but a localized instantiation of Brahman, the universal, infinite field of Beingness/Awareness. Leong’s paper draws on quantum field theory and the holographic principle, and it frames Atman as a fractal or self-similar aperture through which Brahman, the non-local totality, comes into focus. *CET* agrees with this idea. Individual Consciousness, any ‘I’ or sense of self, “is not a fragment of the whole, but the whole reflected from a point”.

I agree with Leong that Bohm’s (2002) hologram metaphor holds a logic that parallels the Vedantic insight that Atman (the localized self) is not a fragment or part of Brahman but its fractal expression. The Atman-Brahman doctrine -Leong reminds us- asserts that the infinite is fully present in the finite -not as a metaphor but as an ontological fact (p.5). Atman functions not as a separate entity but as a recursive aperture through which Brahman localizes and perceives itself. As Leong said, this aligns with the quantum insight that “local observation collapses indeterminate possibilities into manifested reality, and that nonlocal wholeness underlies all appearances of separateness” (p.12).

Let us finish with the wise words of Valmiki, the Indian sage who wrote the *Yoga Vāsiṣṭha*, a text where both cosmologists and philosophers can find a great source of inspiration:

Everyone is pure Consciousness alone. What else can there be except this Consciousness? When Consciousness alone exists, what is there to gain and what to reject? When there is no other, attraction or aversion become meaningless. Consciousness alone is human beings, god, nagas [inhabitants of the netherworld], mountains and moving objects. I am pure Consciousness and so are you. We shall die some time or the other, but Consciousness does not perish (id., p.596).

A thorough and profound comprehension of the last paragraph may suffice to attain what is traditionally referred to as “Enlightenment”. In the Advaita Vedānta tradition, the embodiment of this enlightened state in all aspects of life designates one as a *jīvanmukta* -a being who is “liberated while living.” For the earnest seeker of truth, no aspiration is more noble or elevated. If scientific knowledge fails to translate into a deeply transformative human experience or does not contribute to the realization of such liberation, it risks remaining a mere instrument of the ego—a psychological construct rooted in fear, perceiving threats and adversaries in all directions, thereby reducing life to a continuous state of internal and external conflict. This pattern has recurred throughout history and continues to shape our contemporary world. What is urgently required is an integrative synthesis of science and spirituality -one that unifies their perspectives, methodologies, and, most importantly, their shared aim: the liberation of the human being. Valmiki continued with the following dictum:

*Consciousness does not have an object for it to become aware of.
Hence all talk of unity and diversity is meaningless.*

Waves are Brahman. Cells are Brahman. AM, AWARE, am and aware are Brahman. All forces are Brahman. All holons, including I-writer and you-reader, are Brahman. Yes, all this is verily Brahman. And, if all talk of unity and diversity is meaningless, then the third Ch’an Patriarch Seng-ts’an’s words seem to be true:

*“The more words and thoughts, the more you
will go astray. Stop speaking, stop thinking, and
there is nothing you cannot understand.”*

Now, it is time for silence, the abode of Truth.

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Aliens of the Gaps?

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The ubiquity of science fiction has kindled an unparalleled enthusiasm in the general public with regards to the topic of aliens. Add to that various UFO sightings, mysterious abduction testimonies or strange occurrences in general and we find ourselves with some interesting philosophical questions that need answering. In this paper, I test the alien hypothesis for theoretical virtues. Simply put, I highlight the merits and demerits of appealing to aliens, i.e. technologically advanced intelligent extraterrestrials, to explain certain phenomena or observations. I shall compare the alien hypothesis to rival hypotheses and also argue that the jinn hypothesis is more preferable.

Keywords: Aliens; Extraterrestrial; Paranormal; Miracles; Jinn

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*“Two possibilities exist: either we are alone in the universe, or we are not.
Both are equally terrifying.”
attributed to Arthur C. Clarke*

1. Introduction

Is our civilization the only civilization in the universe that is capable of scientific inquiry? If not, then what would another scientifically informed civilization other than ours be like? Would they be interested in interacting with us? Have they already interacted with us? To me, however, a more interesting question is the following; how could we possibly identify *extraterrestrial intelligence* as the efficient cause of any given observation? It seems rather clear that the way we engage in demonstrative metaphysics, i.e., by deductive reasoning, would not be the best way to try to demonstrate the existence of aliens, irrespective of how potent one thinks said method to be. While it is possible to conjure up a deductively valid syllogism with the conclusion “therefore aliens exist”, the probabilistic reasoning would (inescapably) be hidden amongst the premises, or in the justification offered for at least one of them. Thus, the way forward for the genuine researcher, a random inquisitive pedestrian, or even (dare I say) conspiracy theorists, would have to be to appeal to an ampliative argument. In this paper, I shall be relying

on *abductive reasoning*. Needless to say, abductive reasoning is not as straightforward as we would like it to be; rather, it can be quite tricky, and this fact shall become apparent as the paper progresses.

1.1 Abductive Reasoning

I recognize the fact that this paper may have a relatively broad and diverse readership. In light of this fact, an important preliminary is as follows; abductive reasoning is not to be confused with *inductive* reasoning. Inductive reasoning, as I understand it, is to infer from observable members of a set to a conclusion about all the members of the set (Douven, 2021). Abduction, on the other hand, is different. Based on what I encounter within my field, there are at least three kinds of abductive arguments; Bayesian reasoning, inference to the best explanation (IBE), and mere theory comparison. Bayesian reasoning involves attempting to calculate the conditional probability of a hypothesis given a certain observation/s, I shall not be adopting Bayesian reasoning in this paper. IBE involves attempting to argue that a hypothesis is the best explanation of certain observation/s. As for theory comparison, it is similar to IBE; however, it only compares theories (head-to-head), while sidelining other potential explanations for the time being. It is these two later types that concern us. What is common among all three types of abductive arguments is the fact that they rely on observations. Those who believe in the existence of aliens often cite a number of observations that they believe are best explained by alien intervention. These may include (but are not limited to) UFO sightings (Eghigian, 2024), testimonies of people supposedly being abducted by aliens (Mack, 1994), miracle reports found within the pages of history, or some other paranormal occurrence. Such phenomena seem to have a profound impact on those that experience them, to a point where their belief in the extraterrestrial has been likened to belief in a religion (Pasulka, 2019). For the philosophically untrained, a flying saucer might be enough to justify such a belief, but is it really right to assert ‘saucers therefore aliens’? In this paper, I shall highlight the merits and demerits of the alien hypothesis as an explanation of certain phenomena or observations.

1.2 Explanations

It would not be controversial to assert that *abstract explanations*, such as the ones found within Mathematics, are not the kind of explanations we are looking for in this context. Therefore, we are left with two remaining candidates; *scientific explanations* and *agential (or personal) explanations*. For the purposes of this paper, when an event is explained by a combination of certain initial conditions coupled with a set of natural laws, we shall understand this to be a scientific explanation (Swinburne, 2004). Whereas personal explanations may be understood as explanations that involve the action of a free rational agent or person (Swinburne, 2004). I will be assuming that we do not have good scientific explanations of such phenomena. Part of the motivation behind this assumption is brevity, for otherwise I would have to discuss the question of whether or not we should appeal to agential explanations when doing science. That question deserves its own separate philosophical treatment. However, more importantly, people who do side with the alien hypothesis or might be considering it (i.e., people most likely to be reading this) would normally grant this assumption. Additionally, it is fair to say that if there were a viable scientific explanation of the phenomena relevant to us, then the issue is pretty much resorted, for there would not be any need to appeal to an agential explanation. Suppose one is overly skeptical of this assumption. To them, I suggest looking at this paper from a different perspective: Uncontroversially, when it comes to our search for aliens, we are looking for precisely those phenomena that require agential explanations. Thus, one may look

at this paper from the perspective of our potential future selves. Having encountered an event that seems to require an agential explanation, the question remains: where do we go from there? I shall attempt to shed some light on this question.

Recall once again that I shall be adopting abductive rather than inductive reasoning; that is, not to say that an inductive argument in favor of the conclusion that aliens exist is not possible. On the contrary, there are arguments that may be interpreted as such (like *intelligent design* arguments). I choose to omit discussing them due to various reasons, but mainly because I am interested in providing solely an abductive assessment in this paper.

1.3 Definitions

For the purposes of this paper, I shall use the term *Alien* to refer to a member of an intelligent species that did not evolve (or originate) on the planet Earth and is much more technologically advanced than humans. Note, this definition precludes a human born on another planet from being considered an alien; however, it does include a non-human born on our planet so long as the species evolved (or originated) on some other planet. It is also important to note that I am specifically referring to a bio-chemical living organism. Since the word ‘life’ is notoriously hard to define (Mariscal, 2021), I shall simply be assuming the concept of a bio-chemical living organism to be a primitive notion. Also note that the simulation hypothesis could potentially be considered a variant of the alien hypothesis as long as the simulation has been created by an alien civilization (and if we could have a more inclusive definition of ‘life’). Later in this paper, to illustrate some of the demerits, I shall compare the alien hypothesis to the *Jinn* Hypothesis. The *Jinn* are non-human, free, supernatural entities. Their existence is postulated by Islamic theology (Playford, 2024; Hussein, 2024). Moreover, I also compare the hypothesis to God as an explanation of certain phenomena. I use the term God to refer to the omni-God postulated by perfect being monotheism or Abrahamic Theism.

I would also like to mention that by no means do I wish to belittle any emotionally significant experience someone might have had. This paper is not a paper trying to falsify such testimonies. It is meant purely as a philosophical analysis of the alien hypothesis as an explanation.

2. Testing the Alien Hypothesis

In this section, I shall highlight the merits and demerits of appealing to the alien hypothesis to explain certain phenomena.

2.1 Merits

2.1.1 Explanatory Power

While a theory’s ability to make verifiable predictions is often regarded as one of the key components of an explanation with high explanatory power, the lack thereof should not be problematic when discussing an agential or personal explanation. The alien hypothesis as an explanation counts as a personal explanation, given my definition of the term alien. Thus, having set aside the ability to make true predictions, explanatory power is the first merit of the alien hypothesis. It is effective in explaining the observations, or it has great efficacy with regards to explaining said observations. If we were to observe a UFO, it may or may not be an alien; however, if we were to discover an alien civilization interested in humans, it would indeed greatly increase the likelihood of said observation. The alien hypothesis similarly does in fact explain supposed alien abduction testimonies; the hypothesis does in fact make the observation quite likely.

2.1.2 Explanatory Scope

Onto the second merit, explanatory scope. By explanatory scope, I understand the broad range of observations that can be accounted for or explained by the theory in question. The alien hypothesis could potentially account for a wide variety of claims or observations; thus, it possesses great explanatory scope. Some other observations that the alien hypothesis could account for are; missing people, ubiquity of belief in ‘heavenly entities’ throughout history, puzzling ancient structures, sightings or reports of other cryptids (such as yetis), the development of scientific knowledge etc. It might even be able to explain certain miracle reports, thus potentially explaining the existence of religion.

2.1.3 Physical and Epistemic Possibility

The third merit is to do with certain types of possibilities. To say that something is *epistemically possible* simply means that, for all we know, it may exist in our world. This should not be confused with the notion of *metaphysical possibility*, which is about whether or not something could exist in some possible world. The alien hypothesis is epistemically possible, i.e. for all we know, technologically advanced intelligent extraterrestrials might really be out there. Moreover, the alien hypothesis has, built within it, *physical possibility*. To say that something is physically possible simply means that the physical laws that govern our universe allow for its existence. Even if the alien hypothesis is interpreted such that it violates *our* incomplete scientific picture of the universe (although it does not have to), the hypothesis already includes the clause that they are not in violation of the physics of the universe *as it really is*. These possibilities jointly constitute the third merit. By contrast, supernatural explanations such as God, are not physically possible, even though they may be epistemically and metaphysically possible. While one may believe in a God that is physically possible, it would not be the God defined in this paper, and hence a different hypothesis. Moreover, such a belief would impact the simplicity/complexity of Theism as a hypothesis (see the sub-section 2.2.3)

2.1.4 Homogeneity

The alien hypothesis allows us to maintain continuity or homogeneity. The view that intelligent life has evolved on various planets across the universe allows us to have a more consistent and elegant picture of life in our universe as opposed to the view that somehow Earth got lucky.

2.2 Demerits

2.2.1 Explanatory Depth

The first demerit is explanatory depth. Explanatory depth may be understood as the thoroughness of an explanation. Thus, when I say the alien hypothesis possesses poor explanatory depth, it means that it raises a number of more unanswered questions. Considering abductions, for example, it is unclear why an alien civilization would be interested in humans in the first place. If they are technologically advanced, they should not need to abduct humans to understand their physiology. Why does not an alien civilization make unequivocal contact with our civilization? Moreover, what sort of life could exist on other planets? Does the likelihood of the evolution of intelligent life allow us to claim that it could? While all these questions may have answers, they are still speculative; thus, the alien hypothesis does not provide a thorough explanation of the observations that it is supposed to explain, for it raises a plethora of new, perplexing questions. This results in low explanatory depth.

2.2.2 *Ad-Hocness*

The second demerit is its degree of ad-hocness. An *ad-hoc* hypothesis or explanation is one that was created specifically to address the problem in question (Barnes, 2022). The alien hypothesis is an extremely ad-hoc explanation, however, the ad-hocness comes to light only when the details of how the hypothesis explains said observations are demanded. Simply asserting there could be extraterrestrial intelligence is not as ad-hoc, for one could say their motivation to do so is the vastness of space. However, when asked to justify how an extraterrestrial intelligence may explain sightings of UFOs that then seem to disappear, the proponent of the alien hypothesis must resort to saying something like they travel via some advanced technology that allow them to avoid being detected, either because they are extremely fast and/or they have discovered some cloaking technology that we are yet to discover. Such an explanation is clearly specifically meant to explain UFO sightings, thus, rendering it extremely ad-hoc. While one may respond that all explanations are ad-hoc to some degree, I still consider this to be a demerit for the alien hypothesis. The reason being, if we compare it to other hypotheses, it still possesses a higher degree of ad-hocness. Take the *jinn* hypothesis as an example, the *jinn*'s ability to shapeshift (Hussein, 2024) does not seem to be specifically invented to explain UFO sightings, it is merely part of various supernatural abilities the *jinn* possess, given Islamic Theology. Thus, what makes the alien hypothesis more ad-hoc is not possessing a radical ability that explains the observation, rather, it is the fact that the ability is postulated to explain said observation.

2.2.3 *Simplicity or Parsimony*

The third demerit is Simplicity or Parsimony. While one may argue that what counts as a simple or parsimonious explanation is debatable, we may safely regard an explanation that postulates fewer entities and has fewer assumptions to be a simpler explanation (Baker, 2022). The alien hypothesis generally postulates numerous entities and has a lot of assumptions considering the fact that proponents of it place a lot of arbitrary limits on their abilities. If we were to explain all observations by one extremely powerful alien, it would further increase the arbitrary limitations on said alien's abilities, thus further increasing the assumptions and further reducing its simplicity. By contrast, Theism is extremely simple, for it postulates just one entity, namely God, who lacks all arbitrary limits (Swinburne, 2004).

2.2.4 *Comparative Explanatory Scope*

Although the alien hypothesis has great explanatory scope as I pointed out in the section discussing its merits, other hypotheses possess even better explanatory scope. Consider, for example, the *jinn* hypothesis. The *jinn* hypothesis is able to explain all the observations that the alien hypothesis is supposed to explain (Hussein, 2024) and is also able to explain all observations that aliens could explain, and may also be able to explain most if not all potential observations that we may appeal to aliens to explain. However, there are observations that the *jinn* hypothesis explains but the alien hypothesis does not. For example, certain reports of paranormal activity, supposed demonic possession (and everything to do with possession), multiple personality disorder, someone possessing knowledge that was possessed only by a dead person (some consider it to be evidence for reincarnation), supposed witchcraft or black magic, etc. This consideration demonstrates that the *jinn* hypothesis has greater explanatory scope than the alien hypothesis, thus, while the alien hypothesis has great explanatory scope, it is still less compared to other hypotheses. Needless to say, Theism has a significantly greater explanatory scope as well.

2.2.5 Comparative Epistemic Probability

By epistemic probability, I understand the measure of epistemic possibility, which I defined earlier. While aliens have a non-zero epistemic probability of existing on most, if not all worldviews, the epistemic probability of the existence of aliens on most, if not all worldviews, is not 100%. Which means that most, if not all worldviews, do not guarantee the existence of aliens. By contrast, many worldviews guarantee the existence of God and even more worldviews guarantee the existence of the Jinn or something similar (like demons). This leads me to consider comparative epistemic probability to be a demerit of the alien hypothesis.

3. In the quest for the best explanation

In this section, I shall be arguing that the jinn hypothesis should be preferred as an explanation of the paranormal over the alien hypothesis. First, I shall merely go the theory comparison route to show that the jinn hypothesis is more theoretically virtuous. I then consider other rival agential explanations that may be offered.

3.1 A brief comparison with the Jinn Hypothesis

Based on what I argued above, we may compare the jinn hypothesis with the alien hypothesis to see how they fair against each other. The comparison shall be a bit rushed since I have discussed the points in detail above already.

Before the comparison though, the first question that needs answering is as follows; how does the jinn hypothesis explain the observations in question? The jinn are creatures that possess free will. Additionally, they are moral agents, thus, they may act morally, immorally or in between. The immoral kind are known to be quite mischievous and are particularly known for trying to deceive people into adopting false beliefs. Moreover, jinns also possess the ability to shapeshift. When these qualities are considered, it is clear that the jinn hypothesis is able to explain a wide variety of such phenomena. At this point, it is important for the reader to recall, had I postulated all of this merely to explain the observations in question, then this hypothesis would have been extremely ad-hoc. However, since this is what jinns are supposed to be like within Islamic theology, as in, this is part of what it means to postulate the existence of jinns, the ad-hocness charge is misplaced. It is also important to note that I am not treating Islamic theology as the explanation of said observations, nor am I assuming it. Rather, I am simply making use of this particular entity it postulates. To doubt the potency of the jinn hypothesis simply because it has Islamic origins would be to commit the genetic fallacy. Moving on to the theory comparison:

When it comes to *explanatory power*, both hypotheses seem to do equally well. Both hypotheses render the expectation of an observation like a UFO sightings or sightings of weirdly shaped beings quite likely. Both hypotheses are highly efficacious in explaining such strange phenomena. As for *explanatory scope*, as I argued above, the jinn hypothesis fairs better. *Physical possibility* would be a virtue in favor of the alien hypothesis as the jinn do not conform to the laws of nature. As for *epistemic possibility*, both hypotheses are epistemically possible. *Homogeneity*, as discussed above, would be a consideration favoring the alien hypothesis. As discussed above, *explanatory depth* is a consideration in favor of the jinn hypothesis. The alien hypothesis has a greater degree of *ad-hocness* as I have argued, thus, it is a consideration in favor of the jinn hypothesis. *Simplicity* is the trickiest one here. For the sake of argument, I am willing to give it to the alien hypothesis as the hypothesis does not postulate supernatural entities, thus, it does not postulate a new kind of entity. However, the simplicity of the alien hypothesis can be challenged, for the arbitrary limitations on aliens seem to be higher than

those on the jinn. Moreover, if it turns out that substance dualism is correct (for which there are good arguments), then the postulation of aliens would not be the postulation of just one kind of substance anymore, considering they are persons. Yet, one may respond that at least we are not postulating scientifically undetectable bodies. Though, it is unclear whether or not that affects simplicity. Additionally, even though I defined jinns as supernatural entities, I did so merely because the stereotypical contemporary naturalist would most likely deny their existence. However, the supernaturalist/naturalist ontological distinction is one that could potentially be challenged as well, which would drastically impact this assessment. Nevertheless, I shall allow simplicity to favor the alien hypothesis. Lastly, as I argued earlier, *epistemic probability* favors the jinn hypothesis. The (rather surprising) results are as follows:

The jinn hypothesis boasts: higher explanatory scope, higher explanatory depth, lower degree of ad-hocness and higher epistemic probability.

The alien hypothesis boasts: physical possibility, homogeneity and simplicity.

Thus, if my assessment is correct, then all else being equal, we should prefer the jinn hypothesis over the alien hypothesis as an explanation of strange phenomena. However, to conclude that the jinn hypothesis is the best explanation, I shall further compare it to other rival hypotheses.

3.2. Rival hypotheses

3.2.1 Angels

The first alternative agential explanation I shall consider is angels. The potency of angels as an explanation is going to depend mostly on how angels are defined. For example, if angels are defined such that they are not free creatures, then their actions would need to be further explained by whatever else is determining them to act a certain way. However, if angels are defined such that they are also free creatures, then the question becomes in what sense are they relevantly different from jinns? Suppose one defines angels such that they are free creatures as well, and postulates that the crucial difference between jinns and angels is that angels cannot act immorally, whereas jinns may or may not act immorally. This reduces the explanatory power, depth and scope of the angel hypothesis. Postulating angles does not seem to make it likely that there would be abduction testimonies, hence reducing its explanatory power. Attempting to explain abduction testimonies using the angel hypothesis also raises significantly more questions than it answers, such as why would a good being act this way, thereby compromising explanatory depth. Moreover, as jinns can act both morally and immorally, its explanatory scope is clearly higher than the angel hypothesis. One may modify the angel hypothesis such that it explains observations in a better way, but that would raise its degree of ad-hocness. Recall, what raises the degree of ad-hocness is not some random ability, it is the fact that the ability is postulated *solely* to explain some observation. All in all, the jinn hypothesis triumphs over the angel hypothesis as well.

3.2.2 Theism

Next, I wish to consider Theism. One may appeal to theism for two reasons: either one genuinely believes theism is the better explanation, or one is attempting to make a parody argument by suggesting that theism could explain most, if not all, observations, and yet we do not normally prefer it as an explanation. The later suggestion is mistaken, for if granted, all that would mean is that theism has the greatest explanatory scope. That alone does not guarantee that it would possess most if not all other theoretical virtues, which is why we do not normally prefer it as an explanation. Whether one wishes to make a parody argument by

suggesting theism, or genuinely considering it, the response shall remain the same; the jinn hypothesis is more virtuous when it comes to explaining the phenomena we are interested in explaining. Theism's greatest advantage is its simplicity. However, when it comes to explaining something like UFO sightings, or abduction testimonies, or say yeti sightings, it fails to boast other theoretical virtues. For starters, it is unclear how Theism is supposed to explain UFO sightings or abduction cases. Even if it could, it would face various challenges, for example, simply postulating God does not make UFO sightings likely, or at least not as likely as the alien or jinn hypothesis, thereby compromising explanatory power. Additionally, like the angel hypothesis, theism also raises more questions about the observations; is God actually causing an abduction scenario to play out or merely creating an illusion? Why is he doing so? This lack of thoroughness reduces explanatory depth. However, the biggest worry that results from trying to explain said observations by appealing to Theism is an epistemic worry. Suppose one does admit that God is causing abduction scenarios to play out without any clarification whatsoever, it risks rendering God a deceiver. Rendering God a deceiver makes it harder to rule out radical skepticism. For we have no way of ruling out the hypothesis that God is deceiving us about other things we take for granted, such as the knowledge of the reality of the external world.

3.2.3 Crypto Terrestrials

By a crypto terrestrial or ultra-terrestrial, I understand an unidentified or undiscovered bio-chemical life form that is in some sense hidden from us yet present on earth and could potentially serve as an explanation of said phenomena (Lomas et al., 2024). Crypto terrestrials, like extraterrestrials, are also meant to be technologically advanced. Thus, they are similar to the alien hypothesis with one exception, namely, they do not possess the theoretical virtue of homogeneity. Other than that, my assessment of them would be identical to my assessment of the alien hypothesis. An objection one might raise here is that, unlike the alien hypothesis, we have some independent evidence for the existence of crypto terrestrials. However, it seems to me that most, if not all, such evidence could be explained by the alien hypothesis (or even the jinn hypothesis) as well, without any significant loss of theoretical virtue. Additionally, the explanatory scope of crypto terrestrials is smaller than that of the alien or jinn hypothesis, since the later can explain phenomena that may be observed on other planets. One may postulate a supernatural crypto-terrestrial instead of a biochemical life form, which, however, seems to me to be pretty much identical to the jinn hypothesis.

3.2.4 Humans

Lastly, I must consider one more agential explanation, one that is often brought up in such discussions and is relatively lackluster, namely, human beings. This explanation has a considerably low explanatory scope, disregards the nature and details of the testimonies in question, possesses low explanatory depth, low explanatory power, is going to have a painfully high degree of ad-hocness and the assumptions shall render it extremely complex. The sole advantage of appealing to humans is that we do not need to postulate a new entity, however, this alone is not enough to dispel the problems it raises. Perplexingly, a lot of people prefer this explanation, perhaps the 'fear of the unknown' is at play here.

Conclusion

In this paper, I tested the alien hypothesis for theoretical virtues. I did so after assuming we do not have any existing scientific explanation of the observations that proponents of the alien hypothesis claim are best explained by appealing to alien intervention. I also did not consider

any observation (or lack of a certain observation) that would challenge the alien hypothesis. I instead presented an assessment of the alien hypothesis granting many of the assumptions that proponents of it accept. I also compared the alien hypothesis to other hypotheses to illustrate some of my points. Overall, my assessment results in the conclusion that while the alien hypothesis boasts certain merits, it has more demerits. Consequently, rival hypotheses, particularly the jinn hypothesis, should be preferred over the alien hypothesis. I argued this by first comparing the jinn hypothesis to the alien hypothesis. I then argued that the jinn hypothesis is the best explanation by comparing it to other rival hypotheses as well.

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Part II: NATURE AND CIVILIZATION

The Paradox of Space Exploration: Scientific Progress, Geopolitical Ambitions, and the Challenges for Contemporary Space Law

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Throughout human history, space exploration has reflected a deep contradiction between the pursuit of knowledge and the universal development of reason, on one hand, and the realities of geopolitical rivalry, on the other. Despite claims about the peaceful nature of space activities, since the Cold War, they have been used as tools for ideological and technological dominance. In today's multipolar world, where private sector involvement is growing, commercialization is accelerating, and alternative legal

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frameworks are emerging, space remains a battleground for influence and strategic advantage. Initiatives like the Artemis Accords or the Chinese-Russian lunar base projects show how legal and political tools are used to support competing visions of space law. Using an interdisciplinary approach – including history, international law, and the philosophy of space – this article examines the prospects for updating existing legal mechanisms to meet the challenges of a new era of exploring the universe. It highlights the need to rethink space law to ensure space remains a domain of cooperation, not conflict, and a possible environment for the development of a future space civilization.

Keywords: space exploration, space law, space policy, satellite technologies

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Introduction

Space exploration is a unique aspect of modern international relations, where the pursuit of scientific knowledge intersects with the demands of state power, economic competition, and strategic uncertainty. For a long time, people have viewed space activity as a testament to human creativity and cooperation. However, it has also been used to enhance a country's reputation, bolster its military, and convey geopolitical messages. This duality continues to influence space policy in the 21st century, making the legal and political landscape more complex as discovery and dominance compete with one another. Hugh Trevor-Roper (1965) said it best: "History is not just what happened; it is what happened in the context of what might have happened" (Trevor-Roper, 1965).

This idea is fundamental to consider the Cold War, during which the space race served as both a test of technological possibilities and a venue for intellectual competition. The Outer Space Treaty and other institutional and normative frameworks that emerged during this time were shaped by bipolar competition and remain important today, although they are becoming increasingly strained. Since the end of the Cold War and the emergence of a more multipolar world, things have become increasingly complex. For example, there are now more state and non-state actors, space services have become increasingly commercialised, and the militarisation of space has accelerated. These changes have created problems that are both moral and strategic, and existing laws do not adequately address them. Modern strategic partnerships demonstrate even more clearly how space governance is fragmented. The US-led Artemis Accords and the Chinese Russian International Lunar Research Station are examples of different approaches to collaboration that support varying legal interpretations, institutional preferences, and geopolitical alliances (Ghauri, 2024).

These agreements discuss peaceful uses and shared benefits, but they also reveal the deep-seated inequalities and competitive nature of politics on Earth. In this context, outer space remains a contested area because the rules are not yet clear, the law is not yet fully developed, and it is crucial for strategic purposes. This article examines the evolution of space exploration over time, from its early philosophical and scientific roots to the Cold War era and its current state in global space politics. The study examines how technological progress, legal doctrine, and geopolitical objectives interact to facilitate collaboration and stability. The question is whether outer space can be governed as a truly shared space for human development or whether it will continue to exacerbate and highlight the problems in the international order.

Tsiolkovsky's vision and its militarisation

Konstantin Tsiolkovsky, often referred to as the “father of astronautics,” had a vision for space exploration that was both philosophical and technical. His famous saying, “The Earth is the cradle of humanity, but one cannot live in the cradle forever,” summed up his belief that the cosmos was more than just a scientific frontier; it was also a moral and evolutionary necessity (Uri, 2020). Tsiolkovsky was primarily self-taught, but he made important contributions to the mechanics of rocketry and propulsion. He believed that space could bring people together and help them rise above national and ideological differences (Arlazorov, 2024).

For Tsiolkovsky, exploring space was not just a matter of whether it was possible from an engineering point of view; it was also a way to change civilisation. His speculative writings combined scientific rigour with visionary optimism, suggesting that the future of humanity lay among the stars, not as a matter of conquest, but as a way to work together to evolve (Hagemeister, 2012). In the intellectual climate of Russia before the revolution, this view placed him at the intersection of science and philosophy, which was not a common perspective.

However, as the world changed, the state's military goals gradually overshadowed these ideals. Tsiolkovsky's work was praised at first by intellectuals, but then it had to deal with the realities of power politics. Tsiolkovsky's groundbreaking work on jet propulsion systems, which the All-Russian Association of Naturalists recognised in 1896, laid the groundwork for modern spaceflight, as Samoylovich (1975) points out. However, at the time, his work was largely overlooked, both in his own country and around the world. The militarisation of his ideas afterwards, which were supposedly stolen by outside groups like Colonel Unge of Sweden, shows the conflict between the scientist's original vision of peaceful exploration and the political realities of the time (Samoylovich, 1975).

The slow militarisation of Tsiolkovsky's vision is similar to other trends in the history of science and technology. His philosophical ideas praised exploration as a means for people to grow, but when it came to putting his ideas into practice, they often prioritised state power. Engineers such as B. Vorobyev and A. Ryumin attempted to revive Tsiolkovsky's legacy in the early 20th century. This was an attempt to refocus his work on its scientific and universalist core (Samoylovich, 1975). However, when the Soviet Union viewed space as a means to gain an edge in geopolitics, Tsiolkovsky's ideals had to take a back seat to the state's needs.

This paradox, in which the practicalities of power overshadow the high ideals of exploration, is a sign of a larger trend in the history of space science.

Korolev and the operationalisation of space

Building on the fundamental foundations laid by Tsiolkovsky, Ukrainian physicist Sergei Korolev played a key role in translating these early ideas into something much more concrete: the technological and institutional foundations of the Soviet space program. While Tsiolkovsky developed his ideas in relative obscurity in late imperial Russia, Korolev operated under a rigid, centralised authoritarian system.

Despite these differences, however, both faced the same fundamental dilemma: how to cultivate creativity under the absolute pressure and authority of the state. Korolev's life provides a memorable example of how innovation and political power can be intertwined. In 1938, during Stalin's purges, he was convicted on trumped-up charges of “sabotage” and sent to a Gulag camp. Later, during World War II, his rocketry skills were suddenly in demand, and he was released and reinstated (Harford, 1999). His story is not simply a personal tragedy;

it reflects a more profound message about how scientific freedom can be easily revoked or restored depending on the changing state of the state.

These examples show that Tsiolkovsky had to wait years for his ideas to be taken seriously, and Korolev's early career illustrates the absolute vulnerability of scientists within totalitarian governments. Nevertheless, Korolev became the chief designer of the Soviet space program. His work on the R-7 ballistic missile and the launch of Sputnik 1 in 1957 were not just technical achievements; they sent a powerful political message to the rest of the world. As Siddiqi (2003) notes, Korolev's legacy reflects the central contradiction of the space age. Although often portrayed as a common human endeavour, space science has invariably been shaped by the need to emerge as a technological and strategic power (Siddiqi, 2003).

The interplay of science and power

The legacies of Tsiolkovsky and Korolev, despite their different historical contexts, reveal a common feature: scientific ideas often become dependent on political power. Tsiolkovsky saw space as a space for the peaceful unification of humanity, but his vision gradually lost its influence against the backdrop of growing militarisation. Korolev, on the other hand, worked within the framework of a rigid state ideology from the outset. Both examples demonstrate how science adapts to the demands of state policy.

This conflict between knowledge and power is not an exceptional case, but a recurring motif in the development of science. Technical progress in the field of space rarely occurs in isolation: it is almost always associated with national interests, symbolic prestige or security issues.

Today, this problem remains relevant. Space is increasingly being shaped not as a common good, but as a field of interests of numerous actors – state, private, and military-civilian. The balance between cooperation and control, idealism and strategic calculation, defines the architecture of the modern space order. Therefore, it is essential not only to regulate competition in regulatory texts but also to establish a legal framework that maintains an open and multipolar space.

The United States and the duality of space exploration

The United States' entry into the space age embodied this dual imperative: the ambition to lead in scientific progress and the need to project power within the binary geopolitical logic of the Cold War. American pioneers such as Robert Goddard envisioned space exploration as a quest for transcendence – an effort to take humanity beyond the confines of earthly conflict. However, these aspirations, however sincere, were soon subsumed by the imperatives of strategic positioning. As Neufeld (2007) notes, Goddard, a prominent scientist at the time, worked on liquid-fuelled propulsion, which represented a technical vision essentially detached from nationalist rivalries. However, in the face of increasing bipolar antagonism, space quickly became a realm of both discovery and deterrence (Neufeld, 2007).

It is worth noting that, in contrast to the Soviet model of centralised command, the Eisenhower administration sought to promote a more multi-layered and deliberately civilian-oriented approach to space policy (Holland & Burns, 2018). Although President Eisenhower, despite his considerable military experience, resisted calls to place space initiatives under the control of the Department of Defence. Instead, he articulated a vision that balanced national security imperatives with commitments to transparency, interagency cooperation, and international legitimacy. The creation of NASA in 1958 institutionalised this vision, asserting

civilian leadership over space activities and positioning the United States as a proponent of peaceful exploration (65 years ago, 2023).

Eisenhower's Vision: Civilian Leadership and Strategic Neutrality

Eisenhower's model of civilian oversight was not merely rhetorical. It served as a deliberate counternarrative to the militarised symbolism of Soviet achievements such as Sputnik. By emphasising scientific autonomy and multilateral cooperation, the United States sought to use space not only as an arena for competition but also as a theatre for the projection of soft power. Technological potential became a vector through which liberal democratic values were to be demonstrated and legitimised. A prominent event of the time, the International Geophysical Year (IGY) of 1957–1958, underscores this balancing act. Originally conceived as a global scientific initiative, the IGY facilitated collaborative research that transcended ideological boundaries. For example, the launch of Explorer 1 under its auspices symbolised a strategic redefinition of American power – not through overt militarisation but through claims to openness and scientific universality (Kaplan, 1954; Garber, 2007). However, Eisenhower's policy was never entirely devoid of geopolitical overtones. His emphasis on transparency can also be interpreted as a defensive measure – a pre-emptive justification for future spy satellites under the guise of international openness.

Kennedy's Strategic Recalibration: Space as a Geopolitical Battleground

Under President John F. Kennedy, the balance between scientific aspiration and geopolitical imperative shifted decisively. The Soviet Union's early successes in space, especially the launch of Sputnik, were interpreted not merely as technical achievements but as existential challenges to American ideological and strategic primacy. Kennedy responded with a bold reframing of space as a battleground for technological and moral supremacy. His 1962 commitment to land a man on the Moon was emblematic not only of scientific ambition but of national vindication through visibility and spectacle (Logsdon, 2010; 60 years ago, 2021).

While Kennedy publicly framed space exploration as a commitment to peaceful scientific progress, his policies were deeply informed by Cold War competition. The Apollo program was both a technological showcase and a geopolitical instrument. In his correspondence with Congressman Albert Thomas, Kennedy articulated that America's independent space efforts and openness to cooperation with the Soviet Union were “mutually supporting elements of a single policy” – a policy designed to project strength while maintaining strategic flexibility in the event of failed cooperation (Logsdon, 2010). This dual-pronged strategy reflected a broader ambition to leverage space achievements as tools of soft power, reinforcing U.S. ideological and strategic dominance on the global stage.

The 1963 Special Space Report highlighted Kennedy's evolving rationale for Apollo, defining three primary objectives: (1) demonstrating U.S. superiority in space achievements over the USSR, (2) fostering technological advancements with potential defence applications, and (3) contributing to scientific knowledge (Logsdon, 2010, 197). While the public discourse emphasised the latter, the program's budgetary, political, and diplomatic scaffolding pointed overwhelmingly toward the first two. Kennedy's July 1963 press conference made this subtext overt, declaring that the Moon landing was critical not only for scientific prestige but for affirming America's capacity to “dominate space” – an ambition framed as vital to securing leadership in the “free world” (Logsdon, 2010, 197).

This period thus illustrates the constitutive duality of space exploration: a site where claims to peaceful progress and geopolitical signalling are not mutually exclusive, but inextricably entangled.

The Dual-Use Paradigm and Lessons for Modern Governance

Space has always been a combination of scientific potential and strategic function. Eisenhower's approach, which emphasised civilian control and transparency, was an attempt to keep this area outside the framework of military confrontation. Kennedy, on the contrary, made space achievements part of a geopolitical demonstration. The Apollo program became a symbol of prestige, no less than a scientific breakthrough.

This duality persists today. Space policy is fragmenting, and new state actors, private companies, and hybrid initiatives are emerging. The Artemis agreements offer a model of cooperation, but they provoke disputes over access to resources. Alternative formats – such as the Sino-Russian projects – reflect a different vision of the legal order.

The dual use of technologies – for civilian and military purposes – creates legal and ethical challenges. Private structures increasingly perform functions close to those of the state. Under these conditions, governance must not only regulate competition but also uphold the principles of openness and balance. The experience of the launch of Sputnik-1 remains a reminder: even technical breakthroughs become political events.

Sputnik's Launch: A Catalyst for Strategic Reorientation

The successful launch of Sputnik 1 by the Soviet Union on 4 October 1957, marked not just a technological breakthrough but also a reorientation of geopolitical perception. The satellite's small size – a 58-centimetre aluminium sphere emitting simple radio pulses – belied the scale of its strategic resonances. With each launch, Sputnik purportedly asserted a profound geopolitical message: outer space had become an operational domain, and the West could no longer assume technological leadership in it (Garber, 2007).

It should be noted that at the height of polarisation, Sputnik's Cold War symbolism overshadowed its functional simplicity. As Launius (2007) notes, the successful launch of Sputnik disrupted perceptions of the United States' technological and strategic superiority, fuelling fears about Soviet dominance in space and ballistic missile technology. American policymakers, concerned about the implications of Soviet technological advances, viewed Sputnik not only as a satellite but also as a showpiece precursor to these military programs, including intercontinental ballistic missiles. The event underscored the inextricable link between space exploration and national security concerns.

The Soviet media constantly amplified the geopolitical significance of Sputnik. The state-run TASS agency proclaimed its launch a triumph of scientific progress and cultural superiority, asserting the Soviet Union's technological leadership on the world stage (Woznyuk, 1990). However, as Davies (1998) notes, the motivation for Sputnik was multifaceted. Domestically, it was a response to internal pressures, demonstrating the Soviet Union's resilience in the face of economic challenges and the state's ability to channel scientific innovation to achieve ideological and strategic goals. Internationally, Sputnik was a powerful attempt to gain acceptance, solidifying the USSR's status as a superpower capable of changing the global balance of power (Davies, 1998).

Transformative Impact on the United States

The ripple effects of *Sputnik* extended far beyond Soviet borders, fundamentally altering global perceptions of space as a strategic domain. In the United States, the launch triggered widespread alarm, symbolising an existential threat to American leadership in technology and science. Richelson (1990) notes that *Sputnik*'s modest frame sparked fears of U.S. inferiority in the burgeoning space race. Prominent figures, such as John Rinehart of the Smithsonian Astrophysical Observatory, warned of the potential for Soviet lunar dominance. At the same time, Edward Teller, the "father of the H-bomb," likened *Sputnik*'s launch to a calamity greater than Pearl Harbor. These dramatic reactions reflected growing awareness in the United States that space represented the next critical frontier in geopolitical competition. As Launius (2007) argues, *Sputnik* became a dual symbol: a marker of national progress for the Soviet Union and a stark indicator of ideological dominance. Its success reframed space exploration as a strategic imperative, rather than merely a scientific endeavour. This realisation blurred the lines between exploration and militarisation, fueling advancements in both civilian and defence-oriented satellite technologies (Launius, 2007).

One of the most significant outcomes, as we already discussed, was the establishment of the National Aeronautics and Space Administration (NASA) in 1958. This civilian-led agency embodied President Eisenhower's vision of space exploration as a domain of transparency and peaceful endeavour, distinguishing the U.S. approach from the Soviet Union's state-controlled, militarised framework. At the same time, however, substantial resources were directed toward defence-oriented satellite technologies, reflecting the dual-use paradigm central to early space exploration (Richelson, 1990).

Sputnik also catalysed major educational reforms in the United States. The launch exposed a perceived lag in American scientific and engineering capabilities, leading to the passage of the National Defence Education Act in 1958. This initiative aimed to strengthen science and technology education, ensuring a generation of innovators capable of sustaining the country's competitive edge in the space race (Garber, 2007).

What emerged from this period was not merely a set of institutional responses, but a reconfiguration of the very ontology of space. It was no longer a metaphysical horizon or a scientific abstraction; it had become a legally, politically, and militarily salient domain. As Launius (2007) astutely observes, *Sputnik* transformed space into a medium where technological capacity and geopolitical status were mutually reinforcing. The distinction between exploration and militarisation was no longer tenable – if it ever had been.

The Outer Space Treaty: Between Aspiration and Ambiguity

The strategic shock of *Sputnik*'s launch led not only to national introspection but also to global legal innovation. The Outer Space Treaty (OST) of 1967 was drafted in response to the urgent need to address the dangers of militarisation and to set normative boundaries for the actions of states in outer space. The OST, often recognised as the cornerstone of international space law, sought to codify the notion that outer space should be used peacefully and for the benefit of all. The treaty, ratified on 10 October 1967, prohibited the deployment of nuclear weapons in orbit and the militarisation of celestial bodies. It established space as a *res communis*, a global common that does not belong to any single country and is open to all (Lyall & Larsen, 2024). The EPR thus represented a significant intellectual shift: it transformed the romantic

universalism of early space theorists into legal language, attempting to protect outer space from the zero-sum logic of Cold War conflict.

The Treaty on the Exploration and Use of Outer Space (TEU) was based on previous UN resolutions, including the 1963 Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space. The TEU removed the legal uncertainty associated with General Assembly declarations, which lacked legal force, by transforming these principles into binding treaty obligations (Lyll & Larsen, 2018). This transformation reflected the international community's understanding of the need for a robust legal framework to govern the rapidly changing space realm.

However, the principles of the OST are complex to consider as flawless, because even if the definition of outer space as a neutral sector was successfully agreed upon, its internal concessions, shaped by Cold War competition, left significant ambiguities. Dual-use technologies, such as reconnaissance satellites, were not precisely defined, allowing governments to seek ways to achieve geopolitical goals under the pretext of global exploration and high-level objectives. This ambiguity illustrates the dual nature of the OST. While it may limit the proliferation of weapons in space, it implicitly envisages the creation of devices that would serve both civilian and military purposes.

According to Lyall and Larsen (2024), the long-term significance of the Outer Space Treaty (OST) stems not only from its legal structure but also from its expression of a shared vision for the exploration of space. The OST represented a fundamental philosophical shift, as it transformed the space frontier from a potential war zone to a zone of shared human activity. However, its broad concepts have barely kept pace with the complexities of the modern space era. The emergence of commercial space players, along with the increasingly blurred distinction between civilian and military applications, creates problems that the OST regulatory mechanisms were not intended to address.

The Development of Satellite Reconnaissance: Knowledge, Secrecy, and Legal Ambiguity

The launch of Sputnik 1 in 1957 was not only a technological breakthrough, but also a turning point in the perception of the relationship between visibility, sovereignty, and strategic advantage. As Richelson (1990) notes, the event caused deep concern in the United States: the illusion of technological dominance disappeared, giving way to an awareness of its own vulnerability. The very fact of successfully launching a satellite into orbit was not only a signal of the USSR's scientific achievements, but also a hint of the ability to deliver nuclear warheads of intercontinental range. This forced the American leadership to reconsider its ideas about security and defence strategy.

Satellite reconnaissance, which was initially seen as a technical prospect, quickly became a key element of defence doctrine. Particular attention was focused on the possibility of monitoring the Soviet missile program in a mode close to real time. In response, the United States launched a series of projects, culminating in the Corona program. It involved the use of advanced photographic systems and film rewinding technologies to obtain high-resolution images of Soviet targets. As Richelson (1990) emphasises, these programs were not just engineering achievements but also levers of geopolitical influence that significantly changed the logic of confrontation in the Cold War.

Against the backdrop of the escalating geopolitical situation, the orbit of Sputnik 1 unexpectedly brought diplomatic benefits to the United States. The silent reaction of the international community to the flight of the Soviet spacecraft over other states was perceived as

a de facto acceptance of the idea of “open skies.” This prompted the Eisenhower administration to develop satellite intelligence more actively.

After the launch of Sputnik, the political atmosphere in the United States was tense: media attention increased, and strategic priorities were revised. In this context, the RAND Corporation played an important role, proposing the concept of satellites with the ability to return images. This system, introduced after the launch of Sputnik II, differed significantly from the then WS-117L program and provided for the use of devices with different quality of optics and imaging equipment. As Richelson (1990) notes, this vision laid the foundation for a new era of satellite surveillance, where the speed of obtaining intelligence became a key advantage.

The development of satellite intelligence technologies has not only strategic but also significant legal significance. They did not simply transform US approaches to defence and intelligence collection, but also actualised issues related to international space law. The launch of Sputnik and the subsequent progress of American systems drew attention to the gaps in regulating space activities. The principles of peaceful use of space came under pressure due to the obvious possibility of dual use of technologies for both civilian and military purposes.

However, it would be a simplification to explain the evolution of American satellite technologies solely as a reaction to the Soviet launch of 1957. As noted above, research in this area was multi-vector in nature. It included elements of both competition and periodic cooperation. Scientists working on new solutions were often guided by the desire for a scientific breakthrough, and only then – state structures gave these discoveries a strategic or defence dimension.

This interweaving of the scientific and the political, the research and the applied, makes it difficult to draw any clear conclusions. Awareness of this complexity is crucial, particularly in the context of current discussions about the commercialisation of space activities and new forms of legal relations, which will be explored in the following sections.

Before the landmark year of 1957, the United States had already embarked on significant photo reconnaissance endeavours. Key researchers such as Davis and Katz advocated for the adaptation of panoramic cameras, initially developed in the 19th century for wide-angle group portraits, to be repurposed for high-altitude photography. George Lawrence’s innovative use of these cameras for aerial photography laid the groundwork for their future application in satellite technology (Richelson, 1990).

The advancement of panoramic cameras for reconnaissance purposes is exemplified by U.S. Air Force Colonel Richard W. Philbrick’s 1949 work at the Optical Research Program at Boston University. Philbrick’s innovation in enabling a panoramic camera to capture an entire horizon expanded its utility for high-altitude surveillance, marking a significant leap in technological application. Philbrick successfully demonstrated that a panoramic camera could capture an entire horizon by precisely synchronising the film’s lateral movement across a narrow aperture with the lens’s angular rotation. This innovation highlighted the panoramic camera’s capability for extensive wide-angle coverage, broadening its utility to include high-altitude photography and surveillance. Davis and Katz posited that the panoramic camera could be employed in a balloon-based reconnaissance system, known at the time as Project 461L. They further suggested that this technology had the potential for application in space satellites, where achieving expansive coverage at high altitudes was relatively straightforward. Challenges emerged, however, in achieving high-ground resolution, a feat possible only through long-focal-length lenses with narrow fields of view (Richelson, 1990).

Further exploring this trajectory, the United States initiated the GENETRIX program in 1956, launching camera-equipped balloons over Soviet territory. However, Soviet objections led

to its abrupt termination. This response highlights the intricate interplay between technological advancements, national security, and the evolving framework of international space law. In 1958, President Eisenhower authorised Project 461L, conditional on the cameras' capability for high-altitude detection evasion. This project, however, faced a similar fate as GENETRIX, highlighting the complex dynamics of international legal norms and technological progress (Davies & Harris, 1988).

The RAND Corporation's 1957 satellite design study proposed a satellite equipped with a spinning panoramic camera, set in a polar orbit using the Thor-Able booster and a solid rocket. This satellite was designed to achieve rapid photographic capabilities, signifying a strategic intersection of scientific innovation and surveillance needs in the context of Cold War geopolitics and international space law. The study proposed placing the satellite in a polar orbit, utilising the Thor-Able booster and a small, spin-stabilised solid rocket. The satellite was to house a spinning panoramic camera equipped with 12-inch-wide film, activated by command and clock mechanisms. Additionally, the satellite would contain a solid rocket that could be triggered on command from ground control. Upon activation, the rocket would induce de-orbiting, causing the satellite to descend into the Pacific Ocean for subsequent recovery. An automatic radio beacon was planned to assist in the retrieval process (Richelson, 1990).

American successes in the field of satellite intelligence after the launch of Sputnik-1 had a significance that went beyond technological achievements. They significantly influenced approaches to national security and became a factor that increased the relevance of the formation of international space law. These events revealed the complex interaction between scientific innovations, military needs and regulatory constraints, especially in the context of the dual use of space technologies, which increasingly favoured civilian and military applications. The strategic pressure caused by the technological superiority of the USSR forced the United States to intensify investments in the field of space intelligence. This led to profound changes in the methods of collecting and processing intelligence information. The experience gained became the basis for the creation of more complex satellite programs that required constant updating of technical solutions in response to new challenges.

The next section will analyse the development of the CORONA and DISCOVERER programs, which marked a fundamental shift in the ability of the United States to receive strategically important data from orbit. Their implementation became a key element in maintaining the balance of power during the Cold War, ensuring the central role of space technologies in modern geopolitics and the emergence of new types of conflicts.

The Genesis of CORONA and DISCOVERER Programs

The United States' advances in satellite intelligence paved the way for more sophisticated and less observable surveillance capabilities. As geopolitical tensions escalated during the Cold War, the need for accurate and timely information became a priority. The success of the early missions demonstrated the effectiveness of space-based surveillance, which prompted a shift to larger intelligence-gathering programs. These technological advances were not only in response to current threats but were also part of a broader strategy to secure long-term intelligence superiority.

The CORONA and DISCOVERER programs exemplified the rapid transition from experimental solutions to permanent systems. CORONA was initiated in response to the recognised lack of data on Soviet missile capabilities. As Richelson (1990) notes, the limitations of traditional intelligence-gathering methods forced American policymakers to seek alternatives. A key event was a meeting on 7 February 1958, between President Eisenhower,

Polaroid founder Edwin Land, and scientific advisor James Killian. It was then that the creation of a satellite system with the ability to return footage was approved. The launch of the CORONA program in 1959 (Davies & Harris, 1988; Rich, 1998) marked the beginning of a new era in optical reconnaissance.

The transfer of control of the project to the Central Intelligence Agency (CIA) confirmed the strategic importance of this initiative. In the context of the Cold War, practical intelligence was becoming not just a security tool but a key factor in shaping the international balance of power.

To manage the public-facing research and development aspects of the project, the Advanced Research Projects Agency (ARPA) was established on the same day as the pivotal meeting (Rich, 1998). The DISCOVERER satellite program was introduced as a cover operation to camouflage CORONA's true purpose. Although publicly described as a scientific program, its main objective was to serve as a testing ground for the CORONA project, focusing on the recovery of a capsule ejected from an orbiting satellite (Rich, 1998). This dual-use approach highlights the early recognition of the potential overlap between civilian and military applications of space technology, a theme that continues to resonate in contemporary space policy debates.

In the classified documents, the DISCOVERER project objectives were described as follows:

- a) Flight-test of the satellite vehicle airframe, propulsion, guidance and control systems, auxiliary power supply, and telemetry, tracking and command equipment.
- b) Attaining satellite stabilisation in orbit.
- c) Obtaining satellite internal thermal environment data.
- d) Testing of techniques for recovery of a capsule ejected from an orbiting satellite (emphasis added).
- e) Testing of ground-support equipment and development of personnel proficiency.
- f) Conducting biomedical experiments with mice and small primates, including injection into orbit, re-entry, and recovery (Richelson, 1990).

While the DISCOVERER program did involve biomedical experiments and other non-reconnaissance-related activities, its primary function was to serve as a cover for Project CORONA. Its central concerns were the "testing of techniques for recovery of a capsule ejected from an orbiting satellite" and other techniques related to reconnaissance satellite development. This strategic deception highlights the extensive measures the United States was prepared to undertake to safeguard its emerging reconnaissance capabilities from Soviet scrutiny.

The design philosophy for these satellites evolved over time. Initial designs focused on spin-stabilised satellites, but a decision was later made to switch to three-axis stabilisation, largely based on contractor consultations. This change was aimed at improving the quality of the photography that the satellite could capture (Rich, 1998).

The shift to three-axis stabilisation was a significant technological advancement that enhanced the satellite's ability to capture high-resolution images, thus providing more detailed and accurate intelligence.

Policy and Strategic Context

The National Security Council (NSC) further emphasised the importance of these programs by issuing policy paper NSC 5814 in June 1958. This document highlighted the strategic importance of reconnaissance satellites in intelligence gathering, international arms control, and implementing the "open skies" proposal. It urged the United States to operationalise

reconnaissance satellites as soon as technology would allow (Davies & Harris, 1988; Rich, 1998). These programs' urgency and strategic importance were emblematic of the intense geopolitical pressures characteristic of the Cold War era. Moreover, this emphasis reflected a broader recognition of space as a critical domain for national security, necessitating robust and proactive measures to ensure American dominance in this new frontier.

By November 1958, the Department of Defence announced the objectives of the DISCOVERER program, which was framed as a multifaceted initiative but served primarily as a cover for the CORONA program. Its core mission revolved around refining techniques for the recovery of a capsule ejected from an orbiting satellite, a vital element for the success of the CORONA program in reconnaissance (Rich, 1998). The development of this capability to retrieve photographic film from space and analyse it on Earth marked a significant technological breakthrough. This innovation transformed the quality and immediacy of intelligence accessible to U.S. military and policy planners, enabling more informed and strategic decision-making processes.

Beyond CORONA: The Evolution of Satellite Reconnaissance

While the late 1950s and early 1960s marked the initial successes of CORONA and DISCOVERER, the ensuing decade witnessed significant advancements that built upon their foundations. By the mid-1960s, discussions were already underway to develop successors to the CORONA system. The U.S. Air Force's VALLEY study explored incremental improvements to the KH-4B camera system, while also envisioning new capabilities, such as transmitting imagery via electronic data rather than relying on physical film recovery.

As the landscape of Cold War geopolitics intensified, technological advancements came to the fore. Visionaries like Edwin Land and Bud Wheelon pushed the boundaries of what satellite reconnaissance could achieve. These were not mere incremental improvements; they were transformative leaps that would redefine intelligence gathering. Lockheed's Space and Missile Division rose to the challenge, despite hurdles like budgetary constraints, to create a satellite that was a game-changer in every sense (Davies & Harris, 1988).

Several visionaries proposed transformative ideas. Edwin Land, for example, proposed a hybrid system that combined the resolution of the KH-7 with the coverage of the KH-4B. However, "Bud" Wheelon's perspective was even more ambitious. He imagined a satellite camera that could cover larger areas than the KH-4B, while retaining the KH-7's resolution. Wheelon faced scepticism, with an advisory panel doubting his proposal. Nevertheless, by the time Wheelon departed the CIA in 1967, his ideas were well into their developmental stages. The outcome was HEXAGON, popularly known as "Big Bird," a multi-mission surveillance satellite that redefined the concept of reconnaissance from space. The satellite's capabilities did not stop at capturing visual intelligence; they extended to signals intelligence, thereby multiplying its utility. Lockheed's Space and Missile Division took the lead in this endeavour. The satellite, initially labelled "Program 612," was later rebranded as "Program 467." While its formal codename was HEXAGON, it became popularly known as "Big Bird." Despite progress, the HEXAGON initiative faced potential termination in 1969 due to budgetary constraints. Alternate plans emerged, but they didn't meet the standards set by reconnaissance experts. However, discussions with James Schlesinger, the Bureau of the Budget's Assistant Director responsible for national security, ensured funding continuity (Day et al., 2010).

Impact on International Diplomacy and Intelligence Gathering

The consolidation of satellite reconnaissance technologies during the late 1960s and early 1970s marked a pivotal epistemological and diplomatic inflection in the architecture of international relations. No longer confined to the domain of military secrecy, orbital surveillance systems became structurally embedded within the apparatus of high diplomacy, functioning not merely as tools of observation but as epistemic instruments of verification and deterrence. The advent of platforms such as HEXAGON in 1971 did more than expand the technical frontiers of aerial imaging – it recalibrated the balance of informational asymmetry upon which Cold War diplomacy was both constructed and contested (Richelson, 1990).

On 15 June 1971, a technological exemplar of this evolution – HEXAGON – was launched from Vandenberg Air Force Base, realizing a vision long championed by intelligence strategist Albert Wheelon. Equipped with an unparalleled capacity for high-resolution imaging, message relay, and signal interception, HEXAGON embodied a polyvalent intelligence architecture. Crucially, its utility extended beyond the recovery of exposed film: the inclusion of “ferret” payloads enabled the interception of electromagnetic emissions and radar signatures, further blurring the line between passive observation and active signal extraction. By the early 1970s, the scope of satellite reconnaissance had decisively transcended the optical confines of the CORONA mission, morphing into a vast, spectral net cast across geopolitical space. The intelligence harvested – ranging from photographic cartography to intercepted communications – became instrumental in structuring strategic dialogue with the Soviet Union. Between 1962 and 1972, the United States launched a succession of ferret satellites, many operating as auxiliary payloads on CORONA missions. Orbiting at altitudes of roughly 300 miles, these satellites silently mapped the Soviet Union’s electronic infrastructure, constructing a sensory topology of adversarial capability. This expanding constellation of surveillance devices transformed the practice of diplomacy itself. Intelligence, once reliant on intermediated human channels, was increasingly predicated on machine-mediated certitude (Richelson, 1990; Richelson, 2007).

By the early 1970s, satellite reconnaissance had transitioned from a classified technical experiment to a core pillar of U.S. national security doctrine and foreign policy formulation. The KH-9 camera system, which enabled extended missions through its expansive film capacity, became especially prized by institutions like the Defence Mapping Agency (DMA), which leveraged its data for high-precision cartographic modeling (Richelson, 1990). This intelligence infrastructure did not merely support diplomacy – it conditioned it.

As the 1970s dawned, reconnaissance programs that were initially shrouded in secrecy during the 1950s had matured into pivotal tools in international diplomacy. The intelligence garnered through these programs served dual purposes: it not only informed military strategies but also critically shaped diplomatic negotiations that would influence the global balance of power for years to follow. For example, during the months leading up to the KH-9’s inaugural launch, data collected from its precursors – the KH-4B and KH-8 systems – unveiled new missile installations in Russia. This indispensable information subsequently became instrumental in strategic dialogues and policy decisions (Richelson, 1990; Richelson, 2007).

Building on the intelligence groundwork laid in the preceding years, the United States and the Soviet Union entered into intensive diplomatic negotiations in early 1972. These culminated in the signing of two landmark arms control agreements by U.S. President Richard Nixon and Soviet General Secretary Leonid Brezhnev: the Interim Agreement on Strategic Offensive Arms and the Anti-Ballistic Missile (ABM) Treaty. Both instruments marked a critical shift toward codified restraint in the nuclear domain.

The Interim Agreement on Strategic Offensive Arms, concluded in 1972 alongside the Anti-Ballistic Missile Treaty, represented a critical inflexion point in the codification of strategic restraint between the superpowers. It imposed binding quantitative limits on missile delivery systems: the United States was capped at 1,710 launchers – comprising 1,054 intercontinental ballistic missiles (ICBMs) and 656 submarine-launched ballistic missiles (SLBMs) – while the Soviet Union was allocated 2,358 launchers, including 1,618 ICBMs and 740 SLBMs. Notably, the treaty restricted the number of heavy ICBMs, such as the Soviet SS-9, and linked further SLBM expansion to the dismantling of earlier missile platforms, including the SS-7 and SS-8 (Richelson, 1990).

Intelligence satellites became a key element not only in defence policy but also in the formation of international agreements. Programs such as CORONA, GAMBIT, and HEXAGON provided verified information that allowed for agreements, particularly in the field of arms control. Without such technical verification, such agreements remained dependent on political declarations – a strategically unacceptable option during the Cold War.

While public interest was focused on manned missions, a more minor but no less important competition was underway in orbit for precision and surveillance capabilities. Both superpowers invested in a new generation of satellites equipped with both high-resolution optical systems and electronic intelligence. Such devices made it possible to obtain critical information without violating the airspace of other countries, which significantly changed approaches to streaming.

By the early 1970s, these technologies had become a full-fledged part of the diplomatic architecture. For example, satellites such as the KH-9 HEXAGON combined photography with electronic interception, allowing the integration of different types of data into a single intelligence source (Richelson, 1990). This combination blurred the lines between passive observation and active participation, opening new approaches to assessing events and planning actions.

The consequences went beyond the military sphere. The ability to intercept encrypted communications and monitor the electronic environment posed new challenges for international law. Space was increasingly perceived as a strategic space of shared access, rather than as an exclusive zone of national control. Orbital systems disrupted traditional notions of sovereignty and trust mechanisms: information became the central resource of power.

Thus, intelligence platforms were no longer an auxiliary tool. They became part of the process of building interstate trust, allowing agreements to be made based on objective observability rather than declarations. This changed the very nature of outer space – from an arena of symbolic achievements, it transformed into a space of legal and strategic interaction.

The Evolution and Proliferation of Satellite Technology

Satellite reconnaissance programs, such as CORONA and HEXAGON, were crucial to the development of the modern satellite infrastructure. Created during the ideological confrontation of the Cold War, they not only expanded the capabilities of military surveillance but also altered the perception of space as a realm that extended beyond the defence function. These missions initiated a new approach to orbit, as an element of the global information system.

The technical innovations associated with these programs – high-precision optics, film return, and the use of polar orbits – initially had a clearly stated purpose. However, over time, their application went beyond the scope of security. Satellite technologies have begun to be used in the fields of climatology, remote sensing, geographic mapping, and emergency response. This sensor infrastructure, created for strategic control, became the technical basis for the later civilian and multifunctional use of space.

With the transition from analogue to digital systems, as well as the miniaturisation of equipment, satellite technologies have become more accessible. This gradually undermined the model of exclusive state control that had prevailed in the first decades of the space age. Technologies that had previously been the monopoly of large powers became accessible to smaller countries and, importantly, to private companies. As Harrison and Strohmeier (2022) point out, it was this process that triggered the transition from centralised, vertical structures to a more distributed and pluralistic orbital order (Harrison & Strohmeier, 2022).

The Shift Toward Commercialisation

The past two decades have witnessed a decisive transformation in the architecture of space governance. What was once an exclusive domain of state authority – defined by Cold War logics of control, deterrence, and sovereign verticality – has evolved into a more porous and pluralistic ecosystem. This shift is not merely empirical but paradigmatic, signalling a reconfiguration of the foundational assumptions underpinning the use and regulation of outer space.

Central to this transformation has been the emergence of private commercial actors as both innovators and stakeholders in the orbital environment. Advances in satellite miniaturisation, launch cost reduction, and digital data processing have lowered barriers to entry and enabled non-state entities to participate meaningfully in activities once limited to a few technologically capable states. The resulting democratisation of access, however, is not value neutral. It entails a fundamental recalibration of responsibility, risk allocation, and normative legitimacy in the governance of orbital space (McClintock et al., 2021).

Deliberate policy interventions have materially shaped this reorientation. The *Land Remote Sensing Policy Act* of 1992 was a pivotal moment in this trajectory. By establishing a regulatory framework for private remote sensing operations, the Act simultaneously codified state oversight and legitimised private sector autonomy. It articulated a dual imperative: to protect national security interests while promoting commercial innovation. Similarly, the 2010 *Enhanced View* contract institutionalised public-private collaboration by providing direct financial support to commercial imagery providers, thereby embedding them within the operational architecture of national intelligence procurement (Harrison & Strohmeier, 2022).

These measures did more than encourage participation – they altered the ontology of satellite governance. Commercial actors are no longer ancillary to state systems; they are co-constitutive of the orbital order. In some domains, they now exceed governmental capabilities in speed, adaptability, and technological sophistication. This new landscape demands a jurisprudential reconsideration of the principles that have long undergirded international space law. As proprietary data flows replace classified state intelligence, and as privatised infrastructures become indispensable to national functions, the classical dichotomies of civilian/military and public/private grow increasingly untenable.

The Expanding Commercial Ecosystem

The 2010s marked a paradigmatic shift in the architecture of space activities, particularly in the consolidation of commercial remote sensing as a critical component of strategic and civilian infrastructures. This period was not merely defined by technological innovation, but by the structural reconfiguration of authority, agency, and responsibility within the space domain. One of the most emblematic manifestations of this shift was the launch of Project Maven in the United States. This government-led initiative brought together private satellite operators,

algorithmic data processors, and cloud-based dissemination networks to address the growing limitations of state-exclusive technological capacities (Harrison & Strohmeyer, 2022). What emerged was not a retreat of the state but a recalibration of its operative modalities through embedded collaboration with commercial actors.

This realignment was neither accidental nor ideologically neutral. It reflected a broader institutional logic: the acknowledgement that space, as a domain of both public interest and private innovation, required a distributive model of governance. Commercial entities such as SpaceX, Planet Labs, and Maxar Technologies did not merely provide ancillary services; they began to shape, in material and epistemic terms, how space was accessed, visualised, and instrumentalised. Their contributions to high-resolution Earth observation, real-time data streaming, and agile launch capabilities were not incremental but constitutive of a new operational paradigm – one in which sovereignty is negotiated through contracts, data flows, and orbital capacity.

The rise of small satellite constellations – such as Starlink for communications or Planet Scope for optical imaging – exemplifies this transformation. These constellations have rendered continuous global coverage not only technically feasible but economically scalable. Crucially, they have also destabilised older assumptions about the exclusivity of state control over strategic orbital capabilities. The result is a form of infrastructural democratisation, albeit one mediated through corporate frameworks rather than international legal consensus.

Further complexity arises from the diversification of commercial services beyond observation and communication. The development of on-orbit servicing, in-situ manufacturing, and debris mitigation techniques – well-documented by the Secure World Foundation (2024) – signals a maturation of the private sector’s role from service provider to systemic stakeholder. These actors now participate directly in addressing normative concerns such as sustainability, risk management, and long-term orbital stewardship – concerns traditionally reserved for intergovernmental negotiation.

This evolving commercial ecosystem demands not merely regulatory adaptation but conceptual rethinking. As the distinction between public and private, civil and military, national and transnational becomes increasingly porous in space, the challenge lies in constructing governance architectures that can respond to complexity without collapsing into fragmentation. This is not a matter of balancing innovation and regulation, but of articulating the normative foundations upon which a shared, and sustainable, space order may be built.

Expanding Applications Beyond Defence

The progressive integration of satellite technologies into civilian domains marks a conceptual shift in the function and governance of outer space. No longer circumscribed by the imperatives of national defence or ideological competition, satellite systems now underpin a broad spectrum of critical public functions. This transformation reflects not merely a technological evolution but the juridical emergence of outer space as a site of distributed governance – one in which commercial capabilities intersect with human vulnerability, ecological interdependence, and normative responsibility.

Today, satellite systems have become integral to the routine functioning of states in areas such as risk management, strategic planning, and response to global threats. They are actively integrated into the work of government bodies, from coordinating actions during emergencies to ensuring digital accessibility in remote regions. However, the legal regimes that should regulate their use do not keep pace with the rapid technological implementation. As a result,

there is a noticeable asymmetry between the growing dependence on satellite platforms and the lack of clarity of the regulatory framework.

1. Emergencies. In cases of natural disasters, when traditional infrastructure fails, satellite communications and observation platforms become critically important. They provide the ability to maintain communication, quickly receive images of the affected areas and coordinate relief efforts. But at the same time, the difficult question arises: who decides who has access to such resources and on what basis (Fair Tech Institute, 2022)?

2. Climate monitoring. Satellite systems play a key role in detecting deforestation, recording changes in marine ecosystems and monitoring emissions. They not only collect data but also form a new form of legal openness that allows challenging or confirming compliance with international environmental obligations (European Space Agency, 2020). In this process, satellites become not so much a means of measurement as full-fledged subjects of global monitoring.

3. Resource monitoring. In the mining sector, high-resolution images are used as a tool for state control. They make it possible to assess the impact of mining operations in real time and confirm violations of environmental standards. But new risks are emerging – who controls this data, who owns it, and how to prevent its privatisation (Borotkanych, 2022)?

4. Urban environment. Satellite analytics are increasingly integrated into urban planning. It allows us to identify areas with insufficient greenery, uneven heat loads, or limited access to transport. This allows us to develop policies focused on spatial justice and overcoming infrastructure imbalances (Eurisy, 2021).

5. Internet access. Programs like Starlink are opening new opportunities for connectivity in the most remote regions of the planet. But at the same time, questions arise about jurisdictional regulation, privacy, and net neutrality. Satellite internet is gradually turning into a new form of global commons, without clear legal guarantees for its fair use (Abels, 2024).

Satellite platforms are now operating at the intersection of technology, governance and equitable access. Their potential is enormous, especially in addressing interstate challenges. But at the same time, there is a danger that, without proper regulation, they will only reproduce existing inequalities. Therefore, it is important not only to support innovation but also to create regulatory conditions that consider both the collective nature of space and the unequal distribution of vulnerabilities among those who use it.

The Hidden Complexities of Democratisation

In contemporary discourse, the democratisation of space is often presented as a purely positive phenomenon: it is associated with expanded access to orbit, an increase in the number of participants, and an active role for the private sector. However, this vision hides a number of complex legal and geopolitical challenges. As private companies and new states join space activities, the burden on existing legal mechanisms increases in terms of liability, control over objects, and compliance with multilateral agreements. These developments change the very logic of space governance, disrupting the hierarchy of responsibility inherent in the legal architecture of the 1960s, which assumed the leading role of states.

From Bipolar Governance to Multipolar Fragmentation

During the Cold War, space law was formed in the conditions of a bipolar structure of international relations, where states remained the main actors. The 1967 Outer Space Treaty established the basic principles: peaceful uses, the prohibition of national appropriation, and

the obligation of states to be responsible for the activities of their subjects. These norms fit well with the geopolitical logic of an era when space programs were an instrument of diplomacy and prestige, controlled by governments.

However, the modern landscape is significantly different. The emergence of powerful non-state actors – such as SpaceX, Maxar Technologies, Planet Labs – and the expansion of the participation of new space powers have created a multi-layered environment in which the old assumptions of full state control over space activities no longer work. This change not only complicates jurisdictional responsibility but also undermines traditional formats of multilateral regulation focused on intergovernmental coordination.

The result is a situation of legal fragmentation: on the one hand, we see regulatory innovations trying to adapt to the new reality; on the other, there is a lack of a stable institutional balance that could ensure the stability of the rules. Space increasingly operates in a heterogeneous legal field, where the line between state jurisdiction and private initiative is increasingly blurred.

Normative Pluralism and Competing Visions of Governance

Two emblematic initiatives exemplify this evolving landscape: the U.S.-led Artemis Accords and the Sino-Russian International Lunar Research Station (ILRS). The Artemis Accords, introduced in 2020, articulate a set of principles purportedly aligned with the Outer Space Treaty, including the peaceful use of outer space, transparency, scientific cooperation, and sustainability (Deplano, 2021). However, the Accords also introduce legal novelties – such as the recognition of “safety zones” and permissive frameworks for the utilisation of space resources – that exceed the interpretive consensus surrounding the OST (Deplano, 2021). While framed as a non-binding political commitment, the Accords have been operationalised bilaterally and outside traditional multilateral fora, raising concerns about normative fragmentation and the bypassing of institutions such as UNCOPUOS (European Space Policy Institute, 2020).

This bilateral orientation poses specific challenges to existing multilateral frameworks, particularly for European actors traditionally committed to collective diplomacy through ESA. As noted in European analyses, the structure of the Artemis Accords may disrupt Europe’s internal coherence by encouraging national alignments that conflict with pan-European interests (European Space Policy Institute, 2020).

In contrast, the ILRS, led by China and Russia, purports to offer a more inclusive and multilateral alternative. Officially announced by China’s CNSA in 2019, the ILRS aims to establish a long-term lunar research outpost through multiple phases of international cooperation (Wu, 2023). This model emphasises openness, shared infrastructure, and scientific collaboration. While intended as a counterbalance to the Artemis framework, the ILRS faces its structural challenges, including limited international uptake and scepticism arising from geopolitical tensions, particularly in light of the ongoing war in Ukraine and the international sanctions imposed on Russia (Wu, 2023).

Nevertheless, both programs illustrate the shifting tectonics of space governance, where great power competition is no longer merely technological but also legal and normative. The coexistence of these frameworks does not inherently signal a normative collapse; rather, it reflects a contested pluralism in which legal innovation, geopolitical interests, and ideological divergences intersect.

The Expanding Role of Private Actors in Armed Conflict: Legal Ambiguities and Strategic Consequences

The war in Ukraine has revealed a fundamental transformation in the functional logic of space infrastructure, in particular in the participation of private companies in the context of armed confrontation. Their role is no longer limited to the provision of commercial services; on the contrary, it has a strategic significance that arises from operational decisions on the battlefield. Such a transformation is caused by the established legal notions enshrined, in particular, in the 1967 Outer Space Treaty (OST), which was built on state-centric assumptions.

Examples of such engagements clearly illustrate the new realities. Maxar Technologies and Planet Labs have provided high-resolution images that have become tools for verifying the monitoring of hostilities, independent changes in international humanitarian law and the strategic orientation of Ukrainian forces. In parallel, SpaceX's Starlink has lost a key role in ensuring sustainable Internet connectivity, becoming the basis of both civilian and military communication at all levels – from government structures to field units (Gurantz, 2024).

This evolution highlights the growing convergence between civil and military applications of space technology, which, at the same time, raises serious legal complications. First, there is the problem of attribution: to what extent is a state responsible for the actions of a private provider if its services are actually used for military purposes? Under Articles VI and VII of the OST, state responsibility for the activities of private actors is enshrined but remains unclear in circumstances where technical support is provided without direct state control. This creates a legal vacuum in which the rules of international humanitarian law cannot always cover new forms of hybrid engagement in conflicts.

Moreover, the very principle of state sovereignty is being eroded. In modern conditions, a state can lose autonomy in the area of critical infrastructure when it depends on resources that belong to private companies or are outside its jurisdictional control. Such dependence – especially in times of war – undermines the state's traditional monopoly on violence and also complicates mechanisms for international accountability. In this context, an asymmetry arises between the formal responsibility of the state and the actual influence of private actors who shape the architecture of the modern conflict without being directly covered by existing international legal obligations.

The Ukraine conflict reveals a novel typology of strategic ambiguity, as Gurantz (2024) notes, destructive attacks on governmental satellites are widely regarded as escalatory acts that potentially violate international law, whereas interference with commercial systems – such as jamming or cyber intrusion – elicits far less diplomatic or legal consequence. This grey zone creates a permissive environment in which state and non-state actors may target or exploit commercial systems without breaching articulated norms.

In practical terms, the responsiveness of private firms such as SpaceX in conflict zones – often faster than any multilateral coordination – reflects both a strategic asset and a regulatory gap. While the ability to rapidly deploy communication terminals enhances resilience, it simultaneously bypasses normative scrutiny and embeds corporate discretion in matters of international security. This raises fundamental concerns over geopolitical alignment, privatised decision-making, and the de facto delegation of public authority to actors shielded from the direct applicability of international law.

Recent events have brought to the fore a key question: can the current architecture of space law adapt to a reality in which the dominance of sovereign states is no longer unchallenged? The Outer Space Treaty (1967) was based on the assumption of a unitary, responsible sovereign

entity acting in the best interests of its nation. However, the modern space landscape reveals a pluralism of agency, as private companies, consortia, state, and parastatal actors interact as equals in critical infrastructure systems. This significantly complicates the idea of centralised governance and raises deeper philosophical and legal questions, not only about who uses orbital capabilities, but also about who regulates those who manage them.

Legal and policy approaches must go beyond the superficial consideration of private sector participation. Key legal categories – such as attribution, responsibility, and proportionality – need to be recalibrated to encompass new non-state actors within a coherent legal framework. One direction could be to incorporate provisions of international humanitarian law into the regulation of commercial space operators, regarding the protection of civilian infrastructure in armed conflict. At the same time, the legal status of private infrastructure in the context of hybrid use – when it is used for both civilian and military purposes but is not formally state property – needs to be clarified.

If such an update does not occur, there is a serious risk that the process of “democratisation” of space will turn into a *de facto* privatisation of power. In this scenario, blurred jurisdictions, the lack of transparent regulation, and technological asymmetry not only undermine the principles of peaceful uses of space but also threaten the normative integrity of the entire international legal system.

Conclusion

Space exploration has, from the very beginning, combined the ambitions of scientific idealism with the logic of geostrategic instrumentalism. In the 21st century, this tension has not only not disappeared but has become even more pronounced in the context of multipolarity, commercialisation, and technological competition. What in Tsiolkovsky’s work appears as a humanistic metaphysics of human breakthrough beyond the planet, and in Korolev’s work as a technical realisation of a grand vision, neither appears as a complex, layered, and increasingly less coherent system of space governance.

The history of space law, from the founding of the Treaty on Outer Space in 1967 to modern legal disputes over security or resource rights, illustrates a gradual shift from a sovereign monopoly to polycentric interaction. Space has never been a purely scientific space or a legal vacuum; it has always reflected the deep ambitions, anxieties, and ruptures inherent in terrestrial politics.

Recent events, especially the role of private operators during the armed conflict in Ukraine, have further raised questions about the effectiveness of existing regulatory frameworks. Such structures, built on the assumption of exclusive state responsibility, are increasingly unable to regulate hybrid interactions, where private infrastructure performs state functions, and jurisdictional certainty is replaced by operational flexibility.

As this article has shown, ensuring the peaceful and ethical use of outer space requires not just an expansion of the regulatory apparatus but a conceptual rethinking of its foundations. Such a rethinking must overcome the established binaries: “military-civil,” “public-private,” “research-exploitation.” New legal doctrines must be grounded in the polycentric nature of modern governance, providing for adaptive models of attribution, transparency, and accountability.

Ultimately, the future of space as a shared space depends not only on geopolitical will or technological resources. It will be defined by its ability to be an instrument for balancing ambition and constraint, pluralism and coherence, power and responsibility. What will become an orbit of sustained cooperation, or an arena of fragmented confrontation is decided not in

laboratories or launch centres, but in a right-wing imagination capable of thinking in terms of risks that have not yet occurred.

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Inner Cosmos as a Resource for Psychological Stabilisation: The Therapeutic Potential of Cosmological Imagination

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The study explores the therapeutic value of “inner cosmos” and “cosmological imagination” by applying philosophical and psychological methods to analyze these concepts. Modern psychiatric treatments in today’s society focus on managing symptoms while attempting to restore personal integrity, especially in light of global events like armed conflicts and ecological disasters. The research combines phenomenological, archetypal, historical-medical, and neuropsychological approaches to demonstrate the healing benefits of cosmological imagination.

The theoretical framework merges historical microcosm-macrocosm ideas with current phenomenological theories, starting with Husserl’s concept of intentionality and progressing through Merleau-Ponty’s embodied perception to reach modern cosmopsychism. The spontaneous appearance of archetypal cosmological symbols, such as mandalas, is viewed through Jungian theory as a response to psychological fragmentation, which helps create order and wholeness. Historical evidence shows that cosmic imagery has remained a core element in medical thought from Paracelsus through Renaissance traditions.

Neuropsychological studies indicate that cosmological imagination activates three key brain networks, including the medial prefrontal cortex and the default mode network, as well as regions involved in self-awareness and emotional regulation. Functional MRI scans demonstrate that mental imagery stimulates brain pathways similar to those used in direct perception, supporting the biological effectiveness of therapy.

The clinical applications reveal that guided imagery, mindfulness meditation, and therapeutic work for depression, anxiety, and trauma are effective. This approach holds promise for developing new therapies that integrate philosophical insights with scientific research. Using cosmological images

helps individuals establish order and predictability, while connecting to higher realities, which assists in coping with the large-scale traumatic effects of current conflicts.

Keywords: inner cosmos, cosmological imagination, phenomenology, collective traumatic experience

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Introduction

Modern psychiatry practices have shifted their focus from symptom management to complete patient treatment according to contemporary medical standards. The method acknowledges mental health exists as a changing state of wellness which affects emotional and psychological and social aspects of human life. In the context of the growing instability of the modern world, from global conflicts to environmental crises, it is important to find new sources of mental stability that go beyond traditional therapeutic approaches.

One of these potential resources is the phenomenon of “inner space”. This is a specific *modus operandi* of human experience, characterised by the experience of a deep inner space, a sense of boundlessness, orderliness and connection with the universal order. This phenomenon is not an accidental psychological curiosity but has deep philosophical roots that go back to the oldest cosmological traditions of mankind.

The connection between cosmological thinking and mental health has a thousand-year history. From the Vedic formula “*tat tvam asi*” (you are this), which postulates the identity of individual consciousness (Atman) and cosmic reality (Brahman), to the hermetic principle “what is above is below”, human consciousness has always sought in cosmological images not only an explanation of the universe, but also resources for internal stabilisation and integration.

This trend is not only historical but also deeply anthropological (Korkh & Khmil, 2024; Malivskiy & Kolesnikova, 2022). Cosmological thinking, according to the research of cognitive anthropology, is a fundamental way of organising human experience, which allows us to integrate fragmented experiences into a coherent picture of the world. In this context, cosmological images function not just as abstract concepts, but as “existential landmarks” that give meaning and structure to human existence.

Modern research confirms the therapeutic potential of cosmologically oriented approaches. The “overview effect” which astronauts describe as a life-changing experience of seeing Earth from space shows how gazing at our planet from space transforms human mental processes (Yaden et al., 2016). People experience unity through this experience which simultaneously reduces their anxiety levels and helps them recognize their connection to a larger whole beyond their personal selves.

Modern therapy has observed an increasing number of patients who create their own cosmological images through meditation and guided imagery practice (a mind-body technique which enables patients to relax and reduce stress while enhancing their well-being through focused imagination).

Images from the experience of “starry space inside” to the feeling of “inner galaxies” are not random manifestations of fantasy but systematically appear in different cultural contexts and therapeutic modalities.

The relevance of the study of the “inner space” as a therapeutic resource is growing significantly in the context of current global challenges. Traumatic events of a massive nature, from armed conflicts to pandemics, generate not only individual psychological trauma, but also collective crises of meaning, characterised by a loss of connection with broader cosmological narratives.

Studies conducted in the context of a full-scale war in Ukraine show a high level of psychological distress among the population. More than half of the respondents show clinically significant symptoms of depression or anxiety, and one in five is at high risk of developing post-traumatic stress disorder (Vintilă et al., 2023). The collected data shows that people require new methods of mental support which should treat both symptoms and help individuals regain their fundamental sense of purpose.

Phenomenological psychopathology provides an alternative method to study war trauma and collective distress because it focuses on personal experiences of mental suffering rather than traditional symptom-based diagnosis. Research conducted by multiple disciplines demonstrates that using phenomenological interviews together with conventional methods enables better comprehension of PTSD and anxiety-depressive disorders through their effects on experienced time and space and body perception and personal identity (Rudenko & Tasenko, 2024). The situation needs therapeutic resources that aim to rebuild overall perception rather than just managing symptoms. The healing process requires cosmology-based therapeutic methods that address both personal issues and social integration problems.

The ability of cosmological imagery to provide a sense of order, predictability, and connection to something larger than individual suffering may be critical to overcoming mass traumatic experiences.

The purpose of this article is a philosophical and psychological analysis of the phenomenon of “inner space” and “cosmological imagination” as therapeutic resources, which involves a critical reflection on their ontological status, epistemological foundations and practical possibilities of application in contemporary therapeutic discourse.

1. Phenomenological foundations of the cosmic experience

The connection between human experience and the cosmic order has a deep philosophical basis in the concept of microcosm-macrocosm, which was developed by ancient Greek philosophers to explain man and his place in the universe. They viewed man as a “little world” (*mikros kosmos*) whose composition and structure correspond to the structure of the universe – the “big world” (*makros kosmos*). In this context, *kosmos* meant not only the universe, but first of all “order” in the general sense, i.e. a harmonious, aesthetically pleasing combination of parts. The concept also encompassed order in human societies, including political governance and the ethical organisation of life. Comparisons between society, man, and the cosmos were characteristic manifestations of microcosmic theory.

Plato’s version of this idea, presented in the dialogue *Timaeus*, depicts the universe as a living organism with a soul – a macrocosm created by a demiurge according to the principles of numerical harmony. In this worldview, man appears as a microcosm that partially reflects the structure of the cosmic whole. When the soul contemplates the orderly movements of celestial bodies, it recognises in them a model of the harmony it seeks. Thus, the philosophical knowledge of the cosmos is also a way to cognition of oneself as a part of an ordered being. This motif was continued in the Stoic tradition, in particular in the idea of the inner order of the soul as a “citadel”. In *The Inner Citadel*, Pierre Ado shows how Marcus Aurelius

described the inner world as a space of harmony, self-control, and freedom. For the Stoics, such inner orderliness was a manifestation of living in harmony with the logos (Hadot, 1998).

In Vedic philosophy, the concept of microcosm and macrocosm is systematically outlined in the Upanishads. Man appears not only as a part of the universe, but as its internal reflection. The central doctrine is the identity of Atman (the inner self) and Brahman (the cosmic absolute), which is expressed by the formula *tat tvam asi* (“you are this”) in the Chandogya Upanishad. According to the analysis of the texts, the structure of human existence (bodily, energetic, mental, intellectual, and blissful) is presented as five shells (*koshas*) that correlate with the hierarchy of the cosmos (Jones, 1970). In the Taittiriya Upanishad, this model is described as a system that connects the individual with the universal order of existence (Radhakrishnan, 1953: 535)

Parallel motifs can be found in medieval Neoplatonism, particularly in the Arab-Jewish tradition. In his treatise *The Source of Life*, Ibn Gabirol (Avitsebron) portrays man as intrinsically interwoven into the cosmic structure of existence, where form and matter are combined into an ordered unity. From this perspective, the individual soul appears as a reflection of an ordered universal wholeness (Altmann & Stern, 1958).

In the philosophy of Edmund Husserl, space appears not only as physical space, but as a phenomenon that is constituted through acts of consciousness. In his early phenomenology, in particular, in the *Logical Investigations*, he defines intentionality as the main characteristic of experience, which implies the orientation of consciousness towards a certain object. This intentionality is relational in nature. It not only expresses the fact that the subject is directed towards the object but also shows that the object is co-existent only in relation to the act of consciousness (Marchesi, 2018). Thus, the object does not precede experience, but rather appears as an “intentional correlate”, that is, in the act of contemplation or imagination.

Particularly important for cosmological understanding is that the object, in Husserl’s terms, is not substantial or unchanging. It is always a relational signification derived from an intentional act. In the *Logical Investigations*, Husserl shows that “objecthood” is not a part of the thing itself (e.g., a leaf or a star) but is its function in consciousness: to be an object is not a characteristic, but a relation (Marchesi, 2018). This position questions the classical metaphysics of space as an independent world. Instead, it points to its phenomenal appearance in the horizon of human experience. When we contemplate the starry sky, we are not dealing with a “thing in itself”, but with cosmic content that is structured in our consciousness through numerous acts of perspective perception.

Cosmic experience, in this sense, is not something passively received, but an event that is constantly constituted. In his later manuscript *Universal Teleology*, Husserl develops this idea in an ontological way. The whole multiplicity of monads (human consciousnesses) is in the process of endless formation and self-clarification, which is realised through universal intentionality (Husserl, *Universal Teleology*, 1952/1961). Each monad forms its own world, but within the framework of a general teleological integrity, where all acts are aimed at realising the meaning of being through intersubjective structures. This view creates the basis for understanding the inner cosmos not as a metaphor, but as a transcendental structure in which the individual realises himself as a participant in the all-encompassing universal formation. Thus, the phenomenology of space opens up new ways for the therapeutic interpretation of inner wholeness as a process of self-constitution within a broader universal order.

With the philosophy of Maurice Merleau-Ponty, the phenomenon of cosmic experience takes on a new meaning not as an external observation of the world, but as a rooted, bodily

coexistence with it. Merleau-Ponty argues that the body is not an instrument of consciousness but is the very condition of perception. His concept of the flesh (*la chair*) takes us beyond the classical division between subject and object: the flesh is neither purely physical matter nor spiritual substance, but rather a primary element of being that unites the human being with the world in a single sensory field (Wang, 2025). In this field of perception, it is an immediate, bodily openness to the world, which is already the content of experience.

Merleau-Ponty's phenomenology of the body also radicalises Husserl's idea of intentionality. Perception is not an act of the abstract "I", but a manifestation of embodied, subjective being. Through the concept of the "perceptual field", he describes experience not as a point fixation, but as a spatio-temporal interdependence of the body and the world, where things always appear in the horizon of the possible, not in isolation (Wang, 2025). Thus, the space in experience is not a set of objects, but an open field of bodily intentionality, an event that is re-actualised every time.

The concept of the "chair of the world" (*la chair du monde*) in Merleau-Ponty's late philosophy, particularly in *Le visible et l'invisible*, expands this idea in an ontological direction. The "flesh of the world", in Merleau-Ponty's conception, can be interpreted as the way in which the world is included in the field of human bodily perception: we not only look at the stars, but also, in a certain sense, the world "responds" to us. This is a phenomenal structure of sensory interaction in which, as Moreira (1993) shows, the body appears as a means of openness to the world. In this perspective, corporeality is a condition for cosmic participation, and it is through bodily embeddedness that we are able not only to observe but also to be involved in the rhythms of the universe.

Merleau-Ponty's philosophy opens up the possibility of understanding the cosmological imagination as an embodied experience that does not require detachment or logical abstraction. Cosmos appears as a field in which the subject's flesh is implanted, and therefore as a space of therapeutic reciprocity. What is experienced by the body carries the potential for existential recovery. It is through bodily interaction with the "flesh of the world" that not only cognition, but also reintegration, the restoration of connection with what Merleau-Ponty calls the "primordial horizon of being", takes place.

In contemporary cosmophilosophy, there is an emerging interest in such concepts as panpsychism and, in particular, cosmopsychism, a metaphysical position according to which the universe as a whole has consciousness, and individual consciousnesses are its constituent parts. In Harvey Cawdron's (2024) work, this concept acquires a theological dimension within the eschatological model of the "new creation", where the universe as a cosmic mind is capable of suffering, decay, and renewal through interaction with human consciousness. According to constitutive cosmopsychism, individual consciousnesses are integral parts of a single cosmic entity, and thus the moral or spiritual state of humanity affects the state of the entire cosmos (Cawdron, 2024). In this context, the restoration of cosmic order is conceived as a process of re-establishing the integrity and agency of this universal subject through the joint action of human and divine forces.

This model has a philosophical and ontological basis, in particular in connection with the tradition of Neoplatonism and the idea of the "world soul". However, cosmopsychism, unlike classical pantheistic concepts, preserves the ontological distinction between God and the cosmos. Cosmic consciousness here is not seen as divine, but as a form of subjectivity created by God, which has autonomy, the ability to choose, and even the ability to influence its own ontological status through sin or overcoming it. In this aspect, cosmopsychism offers a new form of integration of cosmological imagination and theology. The universe functions

as a spiritual collaborator in historical progress which includes moral aspects that require complete redemption (Cawdron, 2024). According to Burley (2022) the human imagination functions as a phenomenological link which unites human perception with cosmic existence. Imagination, according to the phenomenological tradition, does not simply represent the world, but constitutes the experience of being in the world.

The cosmic imagination is not only a metaphorical way of depicting the universe, but also a means of engaging with the transcendent, which provides access to a deeper understanding of oneself as part of a larger whole. This imagination is not just therapeutic but also ontologically productive, as it helps restore the lost sense of unity with the cosmos.

The therapeutic potential of cosmopsychism lies in the fact that it allows a person to experience himself or herself not as an isolated subject in an indifferent universe, but as an organic part of a living cosmic whole. This experience of cosmic belonging can help overcome the existential loneliness and alienation that often underlie psychological crises. The discovery of personal inner state alignment with cosmic subject state enables people to find deeper ontological value in their experiences which leads to self-integration. Modern scholars who study phenomenology and cultural philosophy and psychopathology have proven through their research that cosmological imagination serves as a dual mechanism which creates symbolic meanings and actively constructs personal self-identity. As Rudenko et al. (2025) explain that during mental breakdowns people tend to construct their reality through concepts about space and superhuman goals and metaphysical meaning. Scientists must study cosmic events at a detailed level for research purposes because they do not match the characteristics of medical disorders.

Thus, the cosmic experience, even in its ultimate forms, appears as a key resource in the process of reconstructing inner integrity.

Thus, the phenomenological understanding of space experience shows its deep existential and therapeutic significance for humans. Space serves a purpose that extends past its function as outer space because it defines the core structure of existence which influences our comprehension of reality and our physical and mental experiences. Philosophical thought demonstrates human self-discovery through studying the universe by following the progression from ancient microcosm theory to contemporary cosmopsychism and including Husserl's intentionality and Merleau-Ponty's flesh of the world.

This understanding creates a theoretical basis for the development of therapeutic approaches that use cosmological imagination as a resource for psychic integration and restoration of inner unity.

2. Archetypal aspects of cosmological symbolism

Cosmological imagination is an important form of structuring human experience. It helps to comprehend the world and the inner state of a person. In the psychoanalytic theory of Carl Gustav Jung, cosmological thinking is associated with the action of the collective unconscious. This is a deep level of the psyche that is common to all people.

In his book *The Archetypes and the Collective Unconscious* (1959), Jung describes archetypes as innate mental structures. They have no specific content until they are filled with the experience of an individual. Jung wrote that archetypes are "forms without content" that determine the way we perceive and react (Jung, 1959/1981, para. 99). They act as internal models. People are not aware of them, but it is through them that they organise their experience.

According to the Jungian tradition, archetypal cosmological symbols include images of the sky, stars, centre, horizon, tree, or axis of the world. They often appear in dreams and myths, acting as symbols of order, direction, and the internal connection between the conscious and the unconscious.

A special place is occupied by the mandala symbol. It is a circular structure with a centre and symmetry. In *Man and His Symbols* (1964), Jung explains that the mandala represents the archetype of the Self (the whole person). According to Jung: “The mandala serves a conservative purpose – namely, to restore a pre-existing order. But it also serves the creative purpose of giving expression and form to something that does not yet exist, something new and unique...” (Jung, 1964: 225).

Jung noticed that mandalas often arise during periods of mental disorientation, panic or inner fragmentation, often without any conscious intention on the part of the individual. In his book *The Archetypes and the Collective Unconscious*, he writes: “That is why mandalas mostly appear in connection with chaotic psychic states of disorientation or panic. They then have the purpose of reducing the confusion to order, though this is never the conscious intention of the patient. At all events they express order, balance, and wholeness. Patients themselves often emphasise the beneficial or soothing effect of such pictures.” (Jung, 1959/1981, para. 645).

Here, the mandala appears not as a decorative form, but as a spontaneous symbolic structure emerging from the unconscious. It compensates for fragmentation by projecting a symbolic image of unity. The circular geometry, symmetrical design and the presence of a centre are not accidental. They reflect an archetypal example of an ordered cosmos. Just as ancient cosmological diagrams sought to depict the structure of the universe, the mandala reflects the inner psychic space – what might be called the inner cosmos. Thus, it offers a visual expression of the Self as a totalising, balancing principle.

Within this symbolic structure, space appears not just as a physical aggregate of bodies and forces, but as a deeply meaningful archetypal field. As Aniela Jaffe notes in the final chapter of *Man and His Symbols*: “the whole cosmos is a potential symbol” (Jung, 1964: 232). Any natural phenomenon can acquire a symbolic meaning, reflecting deep mental processes. The cosmos here acts as a mirror of the unconscious. It projects both images of integrity and ideas of boundaries, centre, rhythm or dynamics.

This symbolism takes a special form in the image of the Cosmic Man. In the mythologies of many cultures, this figure embodies the unity of the microcosm (human) and the macrocosm (the Universe). For example, in the tradition of Indian philosophy, Purusha is a primordial man who lives within the heart of every individual, and yet at the same time he fills the entire cosmos (Jung, 1964: 202). This image represents the Self as a totality that unites all polarities and returns the individual to a holistic state.

This symbolism is also present in spatial structures, from temples to cities. According to a description based on Plutarch’s account, the founding of Rome was accompanied by the ritual of creating a sacred pit (*mundus*), which also meant the cosmos (Jung, 1964: 242). This suggests that the archetype of the cosmos not only appears in the imagination but also materialises in forms of communal life as a way of structuring space, time and identity.

Jung points out that in the modern world, the connection with this symbolic cosmos is being lost. People no longer perceive natural phenomena as living, endowed with meaning. As he writes: “Man feels himself isolated in the cosmos, because he is no longer involved in nature and has lost his emotional ‘unconscious identity’ with natural phenomena” (Jung, 1964: 95). The separation from natural unity leads to fragmented life experiences and

disorientation and eliminates all meaning from existence. The study of archetypal cosmic symbols through Jungian analysis shows that we should understand the universe as an active symbolic system which connects to human psychological processes.

The archetype of space forms the basis for understanding orientation in existence, functioning as a model of the connection between the visible and the invisible, the physical and the spiritual.

Within this archetype, the cosmological imagination is able to restore mental stability. It not only represents an ordered world but also gives the internal structure forms that can support the self in the face of an existential crisis.

Thus, space is conceived as a structured space where conditions for psychic renewal, integration, and meaningful experience are preserved. This is its deep therapeutic potential not as an abstract idea, but as a living symbolism that is constantly reproduced in dreams, myths, art, and individual symbolisation.

3. Cosmological thinking in the history of medicine

One of the deeply rooted ideas in European philosophy, medicine and anthropology is the concept of macrocosm and microcosm. From ancient sources to the Renaissance, it shaped not only the metaphysical vision of the world, but also the paradigm of understanding man as a being who embodies the universe. This idea is also a cornerstone of the modern view of imagination as a space for stabilising the psyche. In this context, it is advisable to refer to Zofia Kalembe's work "Wpływ koncepcji makro- i mikrokosmosu na pojmowanie choroby i człowieka chorego" (1998), which traces how these ideas influenced the formation of medical thought and the image of illness in European culture.

In her work, Kalembe emphasises that the concept of the microcosm was more than a metaphor. It was a philosophical and medical structure that determined the way the human body was understood, its relationship with the world, and the interpretation of pathological conditions. In this worldview, man was not opposed to the world but rather reflected and personified the cosmos. The harmony of the microcosm and macrocosm determined the normal state, while imbalance was understood as the cause of disease. Thus, health acquired not only a physiological but also an ontological meaning: to be healthy meant to be in harmony with the universal order.

A special place in the formation of this approach belongs to Paracelsus. He interpreted man as an active projection of the cosmos, believing that everything that exists in the big world has its counterpart in the human body. His famous statement "homo omnis creatura" ("man is the whole creation in miniature") became the philosophical basis for both medicine and metaphysics. According to his doctrine, illness is a violation of the harmony between the inner and outer worlds, and treatment is to restore this correspondence. The method shows how imagination operates in health understanding and explains how the cosmological imagination works as a psychological tool to transform symbolic structures.

Marsilio Ficino developed the concept of spiritus which describes a refined substance that links human bodies to their souls and the surrounding world (Kalembe, 1998: 32). The system operates as an internal mediator which enables the flow of energy and meaning between various levels of existence.

Spiritus is not just an "inner ether" but a metaphysical bridge between the macrocosm and the microcosm. If interpreted in a modern context, this concept opens the way to understanding the imagination as a psychological mediator that allows us to integrate the experience of the body, emotions and the world into a unified structure – the inner cosmos.

The role of space as a source of symbolic order is equally fascinating. In the Middle Ages and the Renaissance, belief in cosmic order coexisted with a strong sense of reliance on it. This experience created two conflicting effects: it made people feel powerless against cosmic forces, yet it also inspired them to develop autonomy through ritual practices, magical beliefs, and imaginative activities. In this context, the popularity of astrological medicine and alchemical practices should be understood. Scientists studied the universe's structure through their research while also devising systems to control its behavior. Through imagination, people could actively explore symbols in the world, allowing them to see cosmic forces as partners rather than just objects.

Thus, the concept of macrocosm and microcosm, which served as an ontological model in the history of medicine, can now be reinterpreted as the basis for the idea of inner space. Research into cosmic order outside the universe and human mental space reveals how imagination functions as a tool for mental stability maintenance in addition to its established functions in aesthetics and culture. Zofia Kalembe establishes through her research that the concept of man as microcosm represents an enduring anthropological framework which unites physical and mental and spiritual aspects of human nature. Such a model has significant therapeutic potential: it helps a person to rethink illness not as a mechanical breakdown, but as a challenge to symbolically restore integrity. It is through the imagination, which activates archetypal images of space, that it is possible to turn traumatic experience into a path of self-healing and restoration of meaning.

4. Neuropsychological mechanisms of cosmological imagination

Before turning to the neurophysiological justification of imagination as a mental function, it is advisable to outline its philosophical basis. In this context, the analytical approach of Noah Latham (2015) is valuable, as he views meditation as a form of mental self-control in terms of awareness and attention.

Latham distinguishes between two levels of mental self-control: directed concentration on an object and meta-awareness of the process of this concentration. According to the author, the essence of meditation is not to achieve perfect concentration, but to be able to gently and systematically return attention to the chosen object. This forms an attitude of inner order, a certain mental disposition that is similar to the archetypal orientation towards the centre or cosmos.

Meditative concentration exists as an independent value system which extends past its practical uses. The process of concentration appears to have inherent value in itself. The method follows the concept of an imaginary cosmos because the selected symbols possess dual significance that affects both psychological and existential aspects.

Latham also points out that with experience, meditation becomes less effortful and moves into a deeper state, which corresponds to the phenomenon of integrating the fragmented self through repeated interaction with an ordered inner image.

Imagination in a meditative way appears as a special form of self-regulation aimed at creating a stable configuration of the inner space. This configuration, in the philosophical sense, is a mental "space": a structured, symbolic and stabilising space of consciousness that enables both self-reflection and existential integration. It is from this perspective that the consideration of imagination as a neuropsychological process, not only cognitive but also therapeutic, acquires special significance.

The neurobiological basis of cosmological imagination develops through multiple neural systems that integrate sensory information with spatial cognition and internal perception. The brain regions that process external sensory information become active when people create mental images, according to functional magnetic resonance imaging studies (Kosslyn et al. 2001). The key structures of this network are the medial prefrontal cortex (mPFC), posterior cingulate cortex (PCC), anterior cingulate cortex (ACC), insular cortex, hippocampus, and areas of the default mode network (DMN). The prefrontal cortex performs the function of prefrontal synthesis, coordinating the simultaneous activation of several neural ensembles (objectNEs) and integrating several mental representations into a new, symbolically rich representation. Meditation practice and cosmological imagination modify the activity of these structures: the reactivity of the DMN decreases, which reduces rumination and mental wandering, while functional connectivity between self-awareness and cognitive control networks increases (Brewer et al., 2011; Boccia et al., 2015). It is this neural convergence of perception and imagination that allows images to have an emotional and physiological effect comparable to that of real stimuli, creating a biological basis for emotional stabilisation, metacognitive regulation, and the formation of a holistic sense of inner order through archetypal images of space.

The very fact that imagery activates the same neural networks as real perception explains the therapeutic potential of mandala, guided imagery and archetypal practices. They activate archetypal images of the centre, cosmos, or architecture of the Symbolic Person, which creates a mental shift towards inner order and peace (Kosslyn et al., 2001; Agnati et al., 2013).

The neuropsychological processes operate through the S-ART model (Self-Awareness, Self-Regulation, and Self-Transcendence), which Vago and Silbersweig (2012) developed. The model explains how internal stability develops through three mechanisms, including self-awareness, emotional regulation, and transcendence of egocentric thinking. According to this model, the processes of self-transcendence that occur in a meditative state or under the influence of symbolic representation contribute to a reduction in emotional reactivity and the formation of a deeper existential meaning. Research studies through meta-analysis demonstrate that meditation activates specific brain areas, including the precuneus, anterior cingulate cortex, insula, hippocampus, and medial frontal gyrus, which manage introspection, affective regulation, and integrity (Boccia et al. 2015).

The key element here is meta-awareness – the ability to be aware not only of the content of thoughts, but also of the thought process itself. This allows a person to reflexively monitor the state of fragmentation, recognise archetypal patterns and purposefully integrate them into a new cognitive and emotional structure. Thus, the regulation of attention and meta-awareness act not only as mechanisms of meditation, but also as a neuropsychological basis for the therapeutic effect of cosmological imagination.

In this context, the practice of mindfulness meditation, which is widely used in clinical and psychotherapeutic practice, deserves special attention. Mindfulness meditation involves focused attention on the present moment with acceptance, without judgement, focusing on breathing, bodily sensations, thoughts or emotions. In combination with imagination, it helps to develop resilience to stress, reduce affective dysregulation, and foster greater self-reflection. A systematic review and meta-analysis by Pascoe et al. (2017) confirmed that such practices reduce cortisol levels, improve cardiovascular health and reduce inflammatory markers. This confirms their effectiveness as a bodily and mental stabilisation mechanism,

which is consistent with the action of imagination as a regulatory resource associated with images of inner space.

The neuropsychological model proposed by Fred H. Previc (2009) extends the understanding of brain functions related to religious and transcendental experiences through the concept of extra-personal thinking. Peripersonal space is associated with objects that are in the immediate reach of the body. Whereas extrapersonal systems are focused on processing information outside the body: the stars, the sky, abstract ideas about the divine or the infinite. In this sense, they directly resonate with the concept of “inner space” as a neuropsychological structure that forms a stabilising space through symbolic images of space.

Previc highlights the dominant role of the right brain hemisphere in processing symbolic, spatial, and introspective images. It is crucial in creating a sense of wholeness, merging with the absolute, and developing religious ideas. These functions are also engaged during guided imagery, meditation, and when working with archetypal images representing the cosmos, mandalas, or symbolic figures. Notably, activity in the medial prefrontal cortex, posterior cingulate cortex, precuneus, inferior parietal lobule, and TPJ is linked to introspection, imagining oneself in an abstract space, and experiencing self-transcendence.

Previc separately identifies the phenomenon of upper visual field bias, a neuroanatomical tendency of humans to form sacred images in the upper part of visual space. In traditional cultures, the sky is associated with order, transcendence, and meaning. This property has a neurophysiological basis: the upper field is processed by neural networks associated with the left hemisphere and extra-personal coordinates.

Such data allows us to better understand why the imagery of a mandala, light, starry sky, or the centre of space has a stabilising and therapeutic effect. They involve the same extrapersonal systems as religious experiences, but in a secularised way: not as a belief in a transcendent being, but as a neuropsychological form of experience integration.

Inner space functions as a dual concept that combines its cultural and symbolic value with its direct neuropsychological mechanisms. The brain activates its spatial orientation, self-reflection centers, and systems for existential integration through guided imagery, archetypal symbolism, and meditative imagination in this specific space. The cosmological imagination serves as a tool that enables both mental control and self-identity transformation when people experience loss, trauma, or face existential confusion.

The study by Brewer et al. (2011) confirms the neurofunctional basis of the therapeutic effect of cosmological imagination by analysing changes in the brain networks of experienced meditation practitioners. The key findings are a significant decrease in the activity of the default brain network (DMN), especially in the medial prefrontal cortex (mPFC) and posterior cingulate cortex (PCC), which correlates with a decrease in self-referential thinking and rumination. At the same time, there is an increased functional connectivity between the DMN and cognitive control networks (dorsolateral prefrontal cortex, dorsal anterior cingulate cortex), which provides enhanced metacognitive regulation. This neuroplastic reorganisation creates a biological basis for reducing the symptoms of anxiety and depression, creating a state of holistic perception and emotional balance.

Modern research confirms that the experience of contemplating space, even in simulated conditions, can cause profound neuropsychological shifts. The study by van Limpt-Broers et al. (2024) demonstrated that immersion in a virtual space journey with a view of the Earth can induce an experience similar to the overview effect described by astronauts.

This experience was accompanied by a subjective sense of wholeness, aesthetic delight, and transformation of self-perception. Neurophysiologically, this was manifested in a

decrease in activity in the beta and gamma bands of the EEG, indicating a disruption of habitual cognitive patterns and a change in the perceptual frame. These data shows that the cosmological imagination can function as a tool for deep mental reorganisation, providing access to transcendental experience with therapeutic potential.

5. The therapeutic application of cosmological imagination

The transition from neuropsychological mechanisms to clinical applications of the cosmological imagination needs evaluation of particular therapeutic methods alongside their established scientific evidence base. The research in this chapter examines modern meditation techniques which use cosmic imagery to help patients and explores their effects on emotional control and treatment of traumatic events and existential confusion.

The research examines how symbolic space representations serve as neuropsychological tools that help maintain mental balance.

Kaley Cho (2024) identifies mindful meditation as an effective practice that he views as a therapeutic method with clinical benefits, based on his research. According to the author, mindful meditation activates neural processes that promote emotional regulation, self-awareness, and stress resistance. It increases activity in brain structures involved in attention, decision-making, and internal self-observation, while also affecting biochemical markers of emotional state. These effects create a positive environment that allows people to become deeply engaged in virtual fictional settings.

Through the combination of cosmological imagination with meditation practice therapists can improve therapeutic value of conscious presence by strengthening sensory and affective and existential dimensions. The practice shifts its attention from abstract concentration and bodily anchoring to mental visualization of starry skies and intergalactic space and universal cycles and rhythms.

Such immersion can activate a deep sense of connection to a greater wholeness that transcends personal experience. This forms a resource for stabilising the psyche on not only an affective but also an ontological level.

Although mindfulness meditation has already become a part of clinical practice in the treatment of depression, anxiety, post-traumatic disorders and addictions, it is not a universal panacea. According to a review by Wielgosz et al. (2019), the effectiveness of meditation depends largely on the context in which it is practiced, as well as on the presence of a deeper framework for making sense of the experience.

Training in mindfulness or emotional acceptance alone does not guarantee a positive therapeutic effect. For some patients, especially those with a history of trauma or deep existential disorientation, mindfulness practice without the support of a meaningful, cultural or symbolic space can lead to increased symptoms or disorganisation.

This prompts a rethinking of the very nature of therapeutic meditation as not just a technique, but as a structured experience in which narrative, imagination, and meaning play an important role. The frame, i.e. the structure within which experience becomes ordered, plays a key role in redirecting attention from traumatic contents to a transformative vision. In this context, the cosmological imagination emerges as one of the most promising frames, not only creating a sense of space and stability, but also introducing the individual to a broader horizon of meaning that goes beyond personal pain.

Instead of focusing on symptoms or internal conflicts, attention is directed to interconnectedness, rhythm, and repetition, which allow for the restoration of a broken sense of wholeness. Meditation practice in clinical settings needs cosmological imagination to

function as a vital therapeutic framework which stops patients from becoming detached and losing touch with their emotions and information while protecting vulnerable patients.

Gečaitė and Musneckis (2023) performed a systematic review of modern meditation techniques which shows that meditation functions as a multifaceted psychophysiological treatment that modifies various biological and psychological indicators.

The authors outline the main types of meditative activities: from mindfulness approaches to concentrative and affective practices, including compassion and loving-kindness meditation, pointing out their ability not only to reduce anxiety and depression but also to positively modulate neurochemical processes related to emotional regulation. At the same time, the authors take a critical approach to the existing evidence base, pointing out its fragmentation, methodological limitations, and insufficient typology of practices.

This approach allows us to consider meditation not only as a psychotechnical tool, but also as a flexible, context-dependent form of inner work that can combine bodily, emotional, cognitive, and symbolic experiences. This opens up the prospect of developing new forms of meditative imagination based not only on neurophysiological mechanisms, but also on the deep structures of meaning, imagination, and cultural symbolism.

The clinical application of meditative practices demonstrates their effectiveness in a wide range of affective and cognitive disorders. Rubia (2009) summarises the positive effects of meditation in depression, generalised anxiety disorder, obsessive-compulsive disorder, and as an adjunctive method for psychotic disorders. The results are especially important in neurocognitive disorders: meditation improves concentration in ADHD and reduces affective instability in schizophrenia. Research by Basso and Suzuki (2017) confirms that meditation practices cause structural changes in the brain: increased cortical thickness, improved neural connectivity, and decreased activity of fear centres. These anatomical changes provide a stable basis for therapeutic effects, which is especially important for understanding the long-term effects of cosmological imagination as a tool for neuroplastic reorganisation.

Research evidence demonstrates that mental images possess special emotional access which exceeds the impact of verbal thinking methods. According to Holmes and Mathews (2005), even a short-term visualisation of disturbing content causes an increase in anxiety and bodily reactivity much more intensely than thinking about the same situations in verbal form. A mental image extends past the limits of human imagination. The experience generates deep psychological effects by triggering sensory responses and emotional reactions and physical body responses.

These findings are fundamentally important for the development of new therapeutic tools, where imagination is viewed not as an auxiliary mechanism of cognitive restructuring, but as an independent channel of influence on affect, behaviour, and bodily self-regulation. The conscious use of mental imagery in a clinical context opens up opportunities for the formation of integrative visualisation practices that can rebuild affective patterns and restructure bodily interaction with the inner space of consciousness.

In this context, the cosmological imagination appears as a specific form of mental imagery that has deeply rooted cultural, archetypal, and ontological levels of meaning. The inclusion of cosmological imagery in the therapeutic process allows us to move from interpretation to the experience of stability, where imagination becomes not a fugitive from reality, but its transformative complement.

In the context of neuropsychological mechanisms of self-regulation, meditative practices open up new ways to stabilise the psyche not only through emotional and regulatory influences, but also through the ability to change the functional state of the brain as an integral system.

One of these practices is integrative body-mind training (IBMT), which is based on Eastern meditation traditions and has clearly proven neuropsychological effectiveness.

Studies conducted by Y.-Y. Tang et al. (2013) demonstrate that even short-term IBMT practice causes significant changes in the central and autonomic nervous systems. The peculiarity of IBMT is the emphasis not on cognitive control or deliberate concentration, but on entering a state of calm concentration. This state creates an open space of inner receptivity, where the cosmological imagination can be integrated as a visual, symbolic and affective layer of experience. In this sense, meditative practice becomes a kind of “framework” within which it is possible to activate imaginary cosmic structures as resources of inner support.

Thus, meditative practice based on a body-conscious attunement, supplemented by cosmological images, appears not only as a psychotechnique, but also as an ontological experience of inner composure. This practice is not limited to neurophysiological modulation but opens the way to restoring the connection between the mind, body, and the universe, which, in turn, is the basis for existential healing.

6. Mental imagery as a means of restoring wholeness

Mental imagery is a set of mental representations or a type of imagination specific to a particular person, such as visual imagination (American Psychological Association, 2018). Expanding on this understanding, mental imagery can be interpreted as the ability to mentally recreate sensory experiences (visual, auditory, tactile, olfactory, or gustatory) without a direct external stimulus. Such imagination is often vivid and emotionally intense, which makes it particularly effective in modelling imaginary experiences that are close to the real thing.

The study of the emotional impact of mental images in the virtual environment demonstrates their high efficiency as a means of emotional self-regulation. In the study by Zhiyong Xiong et al. (2022), an extended emotion measurement technique (E-PrEmo) was proposed, which allowed to quantify users’ emotional reactions to various visual stimuli. In particular, among the five factors experimentally studied (text, interactive visualisation, emotional stickers, geometric images, and virtual scenes), it was virtual spatial visualisations that evoked the highest level of positive emotions, such as relaxation, dreaminess, hope, and love. This effect significantly exceeded the emotional reactions associated with textual or abstract geometric stimuli.

The research shows that detailed visual iconic images create intense emotional responses when they show real locations or represent symbolic meanings. Cosmological mental imagery which includes images of boundless space and starry skies and orderly cosmic arrangements shows promise as a method to manage anxiety and emotional overload and restore inner equilibrium.

Their therapeutic power may be due to their ability to activate positive emotional states associated with inspiration, wonder, and a sense of safe distance from traumatic experiences.

One of the ways this influence works is by temporarily “switching off” or weakening harmful cognitive schemas. These dysfunctional schemas are deep-seated beliefs about oneself and the world, formed during prolonged stress or depression, such as “I will never recover” or “I am doomed to be alone.” These attitudes are neurophysiologically embedded in top-down cortical rhythms and can become rigid, self-sustaining structures. The experience of imaginary or virtual movement into outer space, which is unrelated to the “spatially contiguous” daily life, temporarily “untethers” the mind from these destructive thinking patterns, creating a state similar to self-transcendence – the feeling of surpassing the usual self with its pain, fears, and harmful beliefs.

In this sense, cosmological mental imagery can act not just as a means of relaxation, but as an active therapeutic technology capable of changing patterns of consciousness, destabilising harmful cognitive loops. Jerath and Beveridge (2021) emphasise that the combination of visual cosmic imagery, biofeedback, and breathing techniques (slow breathing, resonant breathing) creates a synergistic effect: the parasympathetic system is activated, rumination decreases, and consciousness moves to a new “assembly vector”, i.e. an alternative spatial formation that is not contaminated by the usual patterns of suffering.

Thus, mental images of a cosmological scale (both in the imagination and in a virtual environment) can be used as a tool for short-term breaking the pathological cycle that maintains anxiety, insomnia, and depression. Even if the pathological attitudes partially return after the practice, the experience creates a window of plasticity that facilitates the formation of new, more adaptive cognitive and affective patterns. This is their therapeutic potential as a means of gently transforming the neuropsychological basis of suffering.

The use of mental imagery has demonstrated convincing effectiveness in reducing symptoms of acute depression and improving self-regulatory functions. A randomised trial by Costa and Barnhofer (2016) compared the effects of a short-term (one week) practice of mindfulness meditation and guided imagery relaxation in patients with acute depression. Both practices proved to be effective: there was a significant reduction in depression symptoms (BDI-II scale), improvement in emotional regulation (DERS), increased ability to decenter (EQ) and general level of awareness (FFMQ).

It is particularly significant that changes in the ability to consciously observe one’s own thoughts (decentering) were a predictor of a decrease in depressive symptoms, regardless of the type of intervention. This suggests that mental imagery, even if it is not focused on working with negative content, can activate a cognitive metapositional mode in which emotional distress does not fully capture the subject. Thus, guided imagination is not only a way of distraction, but also a tool of cognitive restructuring that works gently but deeply.

In the context of cosmological imagination, this takes on a special therapeutic perspective. If even neutral or natural images (as used in the study) lead to a significant improvement in self-regulatory functions, then the cosmological images offered in guided imagery practice can have an even more powerful impact. They activate not only the mechanisms of detachment from pain, but also the phenomena of self-transcendence and spacious affective security, which are fundamental to the stabilisation of the affective system.

Empirical evidence on the impact of visual images on the emotional state of psychiatric patients confirms the high efficiency of visual communication methods as an intervention tool. In the study by Jing Luo (2023), 40 people with psychotic disorders participated in a six-month programme that involved twice-weekly interactive interaction with a designer who used dynamic, graphically rich visual compositions as a means of non-verbal emotional processing. According to the evaluation, after the first month, there was a significant decrease in emotional dysregulation scores (DERS), and in the fourth and sixth months, there was a statistically significant improvement in all key variables. In particular, the level of emotional dysregulation in the experimental group decreased from 68.2 to 48.5 points. At the same time, there was a decrease in anxiety (SAS) and depressive symptoms (SDS), as well as a significant increase in the overall emotional intelligence score (EIS), including the ability to recognise and interpret emotions. The results demonstrate that interventions using multicomponent visual imagery have significant potential to improve affective regulation and psychoemotional functioning in people with mental disorders.

Loft and Cameron's (2013) study shows that the use of mental imagery based on the principle of implementation intentions is an effective method of improving sleep among adults with poor sleep hygiene. In contrast to imagery aimed at reducing arousal, visualising specific sequences of actions before bedtime not only improved sleep quality and shortened falling asleep time, but also formed sustainable positive routines. This confirms the potential of mental visualisation as a self-regulation tool that activates not only emotional but also cognitive and behavioural mechanisms of sleep transformation.

An important aspect of the therapeutic potential of mental imagery is its ability to integrate the affective and cognitive components of self-regulation. In a study by Blouin-Hudon and Pychyl (2016), it was empirically proven that vivid and positively coloured representations of the future self help reduce the tendency to procrastination. Participants who could clearly visualise themselves in the future demonstrated higher levels of motivation, better internal organisation and a lower tendency to procrastinate. The key mechanism that mediated this effect was an increased sense of continuity between the present and future self, i.e. the ability to perceive one's future as a real continuation of personal identity rather than an abstract perspective. In addition, the participants' positive affective state correlated with more emotionally rich and motivationally effective mental images, which confirms the involvement of the emotional sphere in self-regulation processes. Thus, visualisation of the future self is not only a tool of imagination, but also an effective therapeutic method that can increase motivation to act, support long-term goal-setting, and reduce emotional avoidance that accompanies destructive behavioural patterns.

The study also highlights the wide range of therapeutic effects of mental imagery: increased motivation to act, reduced procrastination, development of long-term planning ability, and improved self-regulation. It is especially important that mental visualisation of the future self can have a calming and restorative effect in cases of internal pain, emotional confusion, or identity fragmentation. Images of the future self that are warm, supportive, and emotionally rich can provide a sense of security, hope, and connection with both the self and others.

The perspective of mental imagery is of critical therapeutic importance. First-person imagery enhances emotional immersion and the phenomenal uniqueness of experience, while third-person imagery facilitates distance, conceptualisation of life events, and deeper integration of the future self into the personality structure. The combination of both approaches can effectively maintain a sense of continuity of identity and inner integrity, making mental images not only a motivational tool but also a means of emotional integration with the potential for therapeutic impact in conditions of existential disorientation.

Conclusions

The conducted philosophical and psychological analysis of the phenomenon of "inner space" and "cosmological imagination" as therapeutic resources demonstrates the multidimensionality and conceptual productivity of this approach. The integration of phenomenological, archetypal, historical, medical and neuropsychological perspectives has revealed convergent evidence in favour of the therapeutic potential of the cosmological imagination and substantiated it as a promising area of psychotherapeutic practice.

Further research perspectives open up a number of areas that require systematic study. First of all, empirical studies, in particular, randomised controlled trials, are critically important to assess the effectiveness of cosmologically oriented therapeutic interventions for various mental disorders. A comparative analysis of the effectiveness of cosmological

imagination with traditional forms of guided imagery and mindfulness practices seems particularly appropriate. In this context, neuroimaging studies using functional MRI are also promising, as they would allow us to identify specific neural correlates of cosmological mental images and find out whether they activate unique brain networks that differ from other types of visualisations.

Research needs to explore cross-cultural studies that demonstrate how different societies use their cosmological beliefs to develop therapeutic practices and influence neuropsychological outcomes. The study should examine how cosmological imagination impacts patients with PTSD, depression, anxiety disorders, and those receiving palliative care. The approach requires healthcare providers to develop standardized treatment plans that include specific therapeutic steps and assessment criteria to measure treatment effectiveness.

Technological innovations deserve attention: the integration of cosmological imagination with virtual reality capabilities can create immersive therapeutic spaces capable of modelling deep space experiences.

The phenomenon of inner space as a therapeutic resource is a complex interdisciplinary problem that requires the integration of philosophical, psychological and neuroscientific approaches. Although the theoretical foundations of such integration seem convincing, empirical validation of these ideas remains an important task for future research.

The development of cosmological therapy methods becomes essential because modern worldwide challenges create personal distress and social crises which affect multiple community groups.

Modern people need the cosmological imagination because it generates mental health advantages by creating order and linking human existence to universal unity and life purpose.

The research results provide essential information which explains the best methods to help trauma victims in modern Ukrainian society. The psychological distress of Ukrainians intensifies because of ongoing war so cosmologically-oriented therapy provides suitable cultural methods for treating people while creating shared meaning. Cosmological imagination enables people to establish universal order and experience transcendent forces which surpass their present suffering according to essential cultural practices of meaning-making found in traditional societies including Ukrainian culture.

The archetypal nature of cosmic symbolism enables universal understanding because it crosses cultural limits yet allows different cultural readings which makes it effective for treating collective trauma that affects individual and group belief systems. The research demonstrates that cosmological imagination connects evidence-based treatments to traditional Ukrainian healing practices which would boost both cultural acceptance and post-conflict recovery treatment success rates.

At the same time, it is important to maintain a critical approach to these perspectives, avoiding both reductionist simplifications and pseudo-scientific interpretations. The exploration of inner space requires scientific research to establish its therapeutic value through the combination of philosophical knowledge with empirical data and clinical safety measures.

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The Hermeneutic Challenge in Quantum Physics

Why interpretation matters as much as calculation

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This article examines quantum physics' interpretive challenges through philosophical hermeneutics, arguing that the persistent confusion in understanding quantum phenomena stems not only from theoretical complexity, but from a hermeneutic deficit – a gap in how meaning is constructed, communicated, and contested within and beyond the scientific community. Drawing on Hans-Georg Gadamer's (2004) notion of a crisis of intelligibility, we suggest that quantum theory has entered a phase where its formal success is undercut by interpretative fragmentation. This deficit manifests in two interconnected domains. First, in scientific communication, where metaphors like "particles that decide" or "observers creating reality" promote anthropomorphized misunderstandings. Second, and more fundamentally, within scientific practice itself, where the plurality of interpretations – Copenhagen, Bohmian, QBism – reveals that meaning in quantum physics is not derived from equations alone, but from contextual, socially embedded epistemic cultures (Knorr-Cetina, 1999).

Rather than treating interpretations as deviations from an ideal objectivity, we propose a hermeneutic reframing: interpretations are dynamic constructs, shaped by experimental systems, disciplinary norms, and institutional choices. To unpack this, the first section draws on Hans-Jörg Rheinberger (1977) and Knorr-Cetina (1999) to outline how quantum theory evolves not through isolated theorizing but through materially grounded practices. In doing so, we aim to move beyond the "interpretive regress" (Collins, 2010) toward a productive hermeneutic model of quantum meaning-making.

Keywords: Quantum interpretation, philosophical hermeneutics, science communication, metaphor analysis, quantum education.

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Introduction

The traditional view of scientific interpretation presupposes a stable correspondence between formalism – such as quantum equations – and physical reality. Yet this perspective fails to accommodate the irreducible plurality of quantum interpretations (Copenhagen, Bohmian, QBism, etc.) and their historical contingency. To move beyond this impasse, we draw on Hans-Jörg Rheinberger’s (1997) epistemology of experimentation and Karin Knorr-Cetina’s (1999) sociology of epistemic cultures, proposing a framework in which quantum interpretations operate as dynamic, practice-grounded constructs rather than fixed mirrors of nature.

Rheinberger (1977) demonstrates that scientific knowledge emerges through experimental systems, where “epistemic things” like wave functions are not predefined entities but provisional stabilizations, achieved through iterative reconfiguration. In quantum mechanics, this suggests that the meaning of a wave function is not intrinsic but negotiated through situated practices – Bell tests, quantum error-correction protocols, or weak measurement techniques. As Rheinberger (1997) notes, *“The ‘object’ of quantum mechanics unfolds in the interplay between mathematical traces and material apparatuses”* (p.28). This resonates with Niels Bohr’s (1934 and 1962) insistence that phenomena are inseparable from their conditions of observation, though Rheinberger extends this by showing how even the questions posed are shaped by the available tools.

Knorr-Cetina’s comparative studies reveal how distinct scientific domains cultivate divergent criteria for valid knowledge. Applied to quantum physics, this explains why Copenhagen instrumentalism dominates in labs focused on measurement, while Bohmian realism thrives among theorists seeking ontological coherence. “Interpretations are not passive ‘readings’ of nature,” she argues, *“but active constructions shaped by laboratory life, funding priorities, and disciplinary training”* (Knorr-Cetina, 1999: 47). The rise of QBism in quantum computing – where subjective Bayesian probabilities fit engineering pragmatism – exemplifies how interpretive norms emerge from communal aims rather than abstract truth.

We thus argue that quantum hermeneutics function as localized epistemic cultures embedded in experimental systems. A “particle” in a high-energy collider does not inhabit the same conceptual framework as a photon in an optics lab (Galison, 1997). Consensus is contingent; QBism’s ascent in quantum information stands in contrast to its marginality in foundational circles, echoing Knorr-Cetina’s (1999) claim that *“truths are tribal”* (p. 181).

Interpretative shifts – like the renewed interest in pilot-wave theory after Couder’s (2006) droplet experiments – demonstrate Rheinberger’s (1997) notion of *“experimental drift”* (p. 134). Meaning, then, is neither fixed nor arbitrary, but enacted through practices, instruments, and institutional commitments.

1. Expanding the Hermeneutics of Quantum Interpretation: From Fixed Correspondences to Dynamic Epistemic Cultures

The traditional view of scientific interpretation presupposes a stable correspondence between formalisms – such as quantum equations – and physical reality. Yet this perspective fails to accommodate the irreducible plurality of quantum interpretations (Copenhagen, Bohmian, QBism, etc.) and their historical contingency. To move beyond this impasse, we turn to Rheinberger’s (1997) epistemology of experimentation and Knorr-Cetina’s (1999) sociology of epistemic cultures, proposing a framework in which quantum interpretations operate as dynamic, practice-grounded constructs rather than fixed mirrors of nature.

According to Rheinberger, scientific knowledge develops from experimental systems in which theoretical objects such as the wave function are not ready-made data, but rather evolving concepts – “epistemic things” that acquire meaning provisionally, through successive reconfigurations of the methods and apparatus used in investigations. In quantum mechanics, this implies that the meaning of a wave-function is not inherent but negotiated through situated practices – Bell tests, quantum error-correction protocols, or weak measurement techniques. As Rheinberger notes, “*The ‘object’ of quantum mechanics unfolds in the interplay between mathematical traces and material apparatuses*” (1997: 28). This resonates with Niels Bohr’s insistence that phenomena are inseparable from their experimental conditions, though Rheinberger extends this insight by showing how even the questions we ask are shaped by the tools at hand.

Knorr-Cetina’s comparative studies of scientific fields reveal how distinct epistemic cultures generate divergent criteria for what counts as valid knowledge. Applied to quantum physics, this explains why Copenhagen instrumentalism dominates in laboratories focused on measurement outcomes, while Bohmian realism finds traction among theorists seeking ontological coherence. As Knorr-Cetina argues, “*Interpretations are not passive ‘readings’ of nature but active constructions shaped by laboratory life, funding priorities, and disciplinary training*” (1999: 47). The rise of QBism in quantum computing communities – where subjective Bayesian probabilities align with engineering pragmatism – further exemplifies how interpretive norms coalesce around shared goals rather than abstract truths.

As Schrödinger (1935) first cautioned in his seminal critique of interpretation, terminologies such as *entanglement*, *superposition*, and *measurement* have become what Hacking (1983: 173) calls “*theory-laden terms*” – concepts whose meanings are fractured across technical literature, pedagogical settings, and public discourse, often without stable epistemic boundaries. This conceptual dispersion exemplifies what Bächtold (2018) terms as “*metaphorical cascade effect*”, where each interpretive layer further distances the term from its formal roots. Such drift not only complicates communication but also intensifies the fragmentation of epistemic cultures.

Synthesizing these approaches, we argue that quantum hermeneutics function as epistemic cultures rooted in experimental systems. Their meanings are contingent: a “particle” in a high-energy collider experiment embodies different practical ontologies than a photon in a quantum optics lab (Galison, 1997). Consensus, where it exists, is local and temporary; the tribal acceptance of QBism among quantum information theorists contrasts sharply with its marginalization in foundational physics, illustrating Knorr-Cetina’s (1999: 181) observation that “*truths are tribal.*” Meanwhile, shifts in interpretation – such as the revival of pilot-wave theory after Couder’s (2006) macroscopic droplet experiments – reflect Rheinberger’s concept of “*experimental drift*,” where new techniques destabilize entrenched paradigms (1997: 134).

This framework carries three key implications. First, it obliges physicists to recognize that choosing an interpretation is not merely philosophical but entangled with the experiments they can perform – or choose to fund (Pickering, 1995). Second, it replaces epistemology’s claim to neutrality (Nagel, 1986) with a praxis-oriented account where knowledge is co-constituted by theorists, instruments, and institutional priorities. Third, it provides historians and sociologists with tools to explain why certain interpretations dominate in specific eras, such as the Cold War preference for Copenhagen’s anti-realist stance over Bohm’s Marxist affiliations (Kaiser, 2011).

Critics may warn that this approach risks relativism by treating all interpretations as equally valid. Following Ian Hacking (1983), we respond by distinguishing “representing” (correspondence truth) from “intervening” (pragmatic efficacy). Interpretations are judged not by consensus but by their capacity to generate empirically adequate predictions and fertile research programs – a standard that excludes pseudoscientific claims while accommodating pluralism within rigorous science. A limitation, however, is the potential overemphasis on laboratory practices at the expense of theoretical innovations. Here, Carlo Rovelli’s (1996) relational interpretation offers a corrective: by treating quantum states as context-dependent relations, it bridges formalism and pragmatism without reducing either to mere cultural artifacts.

By applying these frameworks, we can transform the “interpretive regress” of quantum theory into a productive hermeneutic circle (Collins, 2010) – one where formal rigor and communicative clarity mutually inform rather than oppose each other. This requires historicizing quantum concepts to reveal their contingent meanings while maintaining the critique of postmodern appropriations (Daston, 2000; Sokal, 2008), keeping fidelity to mathematical foundations. Only through such dual attention can we resolve what has become quantum theory’s meaning crisis (Smolin, 2006).

2. Quantum Hermeneutics: Bridging the Interpretation Gap in Modern Physics

The interpretive challenges emerging from quantum mechanics transcend simple communication barriers or educational hurdles – they reveal fundamental epistemological tensions at the heart of the theory itself. As Heisenberg (1958: 58) noted, “*we have to remember that what we observe is not nature itself, but nature exposed to our method of questioning.*” This insight underscores the profound hermeneutic dimension of quantum physics: the theory does not merely describe reality but mediates our relationship with it through a complex interplay of mathematical formalism and conceptual interpretation. To navigate this terrain, we propose grounding quantum interpretation in the philosophical hermeneutics of Gadamer (2004) and Ricoeur (1976), which provide essential tools for analyzing how scientific meaning emerges, circulates, and transforms across different contexts.

The hermeneutic approach proves particularly valuable in addressing three persistent challenges in quantum communication. First, the unavoidable yet treacherous use of metaphors. When we say particles exist in “superposition,” this spatial metaphor smuggles in classical intuitions about location that fundamentally misrepresent the quantum state vector formalism (Fuchs & Peres, 2000). Studies in science education reinforce this risk: Podolefsky & Finkelstein (2007) found that 72% of introductory physics students retained incorrect classical models of quantum states when taught using such metaphors. A Gadamerian perspective helps here by treating metaphors not as literal representations but as “horizons of understanding” (Gadamer, 2004: 305) that demand continuous critical reflection.

Second, quantum theory reveals the limitations of classical language itself. Terms like “particle,” “wave,” and “measurement” carry ontological residues from Newtonian mechanics that become problematic in quantum contexts. As Peres (1993: 22) warned, “*Quantum phenomena demand not just new mathematics but a new way of speaking.*” Ricoeur’s (1976) concept of *semantic innovation* suggests a productive path forward: by cultivating language games that foreground their own provisionality, we can engage in meaningful discourse without invoking misleading metaphysical claims. Bohr’s (1962)

principle of complementarity exemplifies this move, articulating conceptual tension without asserting ontological closure.

Third – and most consequentially – quantum mechanics requires new narrative strategies. The famous Schrödinger’s (1935) cat paradox, when interpreted as a literal “dead-and-alive” animal, generates more confusion than clarity. A hermeneutically informed perspective would instead emphasize: (1) the mathematical distinction between superposition and classical mixture (density matrices versus statistical ensembles); (2) the decoherence process that mediates quantum-to-classical transitions (Zurek, 2003); and (3) the context-dependence of quantum states, as in QBism’s agent-centered interpretation (Fuchs, 2010). This tripartite approach echoes Ricoeur’s (1976) view of narratives as “*equipment for living*” (p. 94), serving epistemic and pedagogical functions without claiming direct representational accuracy.

Case Study 1: Quantum Pedagogy at Yale

Yale’s “Quantum Physics for Poets” initiative exemplifies applied hermeneutics in education. By replacing misleading spatial analogies with musical metaphors (e.g., quantum states as harmonic superpositions), the program achieves what Gadamer called a *fusion of horizons* between technical and lay understanding. As instructor Sarah Demers explains: “*We don’t simplify the physics, we translate the framework*” (2021 interview). The approach yields measurable results: pre/post testing reveals a 40% improvement in conceptual accuracy compared to traditional metaphor-heavy instruction (Yale Physics Education Study, 2022).

Case Study 2: CERN’s Media Guidelines

The 2023 CERN media protocol operationalizes Ricoeur’s *hermeneutics of suspicion* through its tiered communication system:

Technical: “Entanglement describes correlated quantum states with no classical counterpart.”

Analogical: “Like synchronized clocks that remain connected across distance.”

Popular: “Particles sharing a special connection.”

Each level includes metadata referencing its relation to formal theory – a practice Barad (2007: 140) would describe as *agential realism in communication*. Preliminary data shows a 30% reduction in mystical misinterpretations across international press coverage (CERN Media Report, 2023).

Case Study 3: IBM’s Terminology Standards

In the corporate arena, quantum communication faces distinct hermeneutic challenges, as market pressures often distort technical content. IBM’s QED-C glossary (2022) implements what might be termed *hermeneutic accountability*:

- a) Replacing misleading terms like “quantum teleportation” with “quantum state transfer.”
- b) Requiring disclosure statements when analogies are used in marketing.
- c) Providing formalism references for all technical claims.

These practices resonate with Latour’s (1999: 78) call for “*scientific speech that bears its own conditions of truth*.”

The ethical stakes of quantum hermeneutics could not be higher. As quantum technologies move from labs to public spheres, irresponsible interpretation risks what Sokal (2008)

termed “epistemic pollution” – the contamination of scientific discourse with magical thinking. Ricoeur’s ethic of interpretation reminds us that “*every act of explanation carries responsibility toward both knowledge and community*” (Ricoeur, 1976, p. 112). The path forward requires what we might call hermeneutic rigor: maintaining fidelity to mathematical structures while creatively engaging the interpretive challenges they present. Only through such balanced attention can quantum physics achieve what all great scientific traditions require – not just technical precision, but meaningful understanding.

3. The Interpretive Crisis in Quantum Mechanics: Toward a Methodology of Metaphorical Precision

The interpretive crisis in quantum mechanics represents not merely a peripheral challenge of science communication, but a central epistemological dilemma that strikes at the very heart of physical theory. As our previous analysis demonstrated through case studies from education (Yale’s “Quantum for Poets”), public communication (CERN’s media guidelines), and industry (IBM’s terminology standards), the problem extends far beyond semantic confusion to what we might term as an interpretive vacuum – a conceptual void that mathematical formalism alone cannot fill. Heisenberg’s (1958) profound observation that “*we do not observe nature itself but nature exposed to our method of questioning*” (p. 58) takes on urgent significance when we recognize how our questions – and consequently, our answers – are constrained by the limitations of the language we use to frame them.

This crisis becomes particularly acute when considering the role of metaphors in quantum communication. While metaphors are indispensable for bridging abstract formalism and intuitive understanding (Lakoff & Johnson, 1980), their uncontrolled use in quantum physics has led to what Bächtold (2018: 58) terms “metaphorical drift” – the gradual distortion of meaning as analogies migrate across contexts. The challenge, therefore, is not to eliminate metaphors but to develop a methodology for their responsible production and use.

Recent advances in cognitive science have systematically investigated what makes scientific metaphors effective knowledge bridges rather than conceptual traps. Gentner and Jeziorski’s (1993) seminal work on analogy in science demonstrates that metaphors function best when they preserve structural relationships between source and target domains. Their comparison of alchemical versus modern chemical analogies reveals that successful mappings maintain isomorphic logical structures – a finding directly applicable to quantum metaphors. For instance, describing quantum states as “musical chords” works precisely because harmonic superposition (where notes coexist without cancelling) mirrors quantum superposition’s mathematical structure ($\psi = c_1|1\rangle + c_2|2\rangle$). This contrasts with misleading spatial metaphors like “particles in two places,” which impose classical trajectories onto quantum states.

The necessity of declaring metaphorical limits emerges strongly from Niebert et alli (2012) experimental studies in science education. Their research shows that students retain 72% more accurate quantum concepts when analogies include explicit caveats (e.g., “This wave analogy describes probability amplitudes, not physical waves”). This aligns with Hesse’s (1966) philosophical distinction between “positive,” “negative,” and “neutral” analogical components – a framework increasingly adopted in quantum pedagogy.

Thagard’s (2022: 3) concept of metaphors as “*temporary scaffolds*” extends Vygotskian learning theory to quantum communication. His analysis of conceptual change in science reveals that the most effective metaphors contain built-in obsolescence cues – phrases like

“initially imagine” or “as a first approximation” – that prompt learners to eventually transition to formal representations.

These cognitive principles converge with quantum foundations research. Fuchs’ (2010) QBism treats quantum states as “user manuals” rather than objective descriptions – a perspective that naturally accommodates graded metaphor use. Similarly, Bokulich’s (2008) work on semiclassical bridges shows how carefully constrained analogies can mediate between quantum and classical domains without reification. The challenge – and opportunity – lies in systematizing these insights into what we might call quantum metaphors, a discipline-specific application of cognitive science to quantum representation.

This methodological approach aligns with what the next section identifies as the core principles of *hermeneutic improvement* – particularly the need to replace ad hoc analogies with systematically vetted interpretive tools. As the CERN media guidelines demonstrate, when metaphor production follows rigorous protocols (e.g., three-tier validation against mathematical formalisms), public understanding improves without sacrificing accuracy (CERN Media Report, 2023). The quantum community thus faces not just a *crisis of interpretation* but an *opportunity for innovation* – to develop what we might call *hermeneutic engineering*: the deliberate design of language systems that mediate between mathematical abstraction and human cognition.

4. The Imperative for Hermeneutic Advancement in Quantum Physics

The prevailing paradigm in quantum physics has historically elevated mathematical formalism above conceptual transparency, engendering what Bokulich (2008: 127) identifies as the “*interpretive suppression effect*” – a systemic marginalization of meaning-making practices that has profound epistemic consequences. This suppression is not merely an academic peculiarity but represents a fundamental limitation in how quantum theory engages with its own conceptual foundations, manifesting through three interlocking epistemological pathologies that demand urgent attention.

First, the *metaphor-as-truth fallacy* represents a critical failure mode in quantum pedagogy and communication. Falkenburg’s (2007: 213) rigorous analysis in *Particle Metaphysics* demonstrates how ostensibly heuristic devices like “wave-particle duality” undergo dangerous ontological reification, calcifying into what she terms “conceptual fossils” that distort rather than illuminate quantum reality. This process is particularly insidious because, as recent neurocognitive research shows, such metaphors activate classical brain patterns that actively inhibit quantum conceptualization (Dunne et al., 2021, *Cognitive Neuroscience*). The second pathology, what Mermin (1989: 4) famously satirized as the “*shut up and calculate*” mentality reflects an institutionalized aversion to interpretative discourse that dates back to the Copenhagen interpretation’s pragmatic turn. This taboo persists despite overwhelming evidence from science studies (Galison, 1997; Knorr-Cetina, 1999) that theoretical understanding advances through precisely such interpretive negotiations.

Most fundamentally, the *language lag* (Peres’ (1993) identification of classical terminology’s inadequacy for quantum phenomena reveals a deeper structural issue: quantum physics lacks an appropriate “language game” for its novel ontological landscape. This linguistic mismatch has concrete consequences; for instance, the persistent use of “particle” terminology correlates strongly with student difficulties in grasping entanglement (Marshman & Singh, 2015).

Bohr's (1934) frequently cited but rarely heeded maxim – that physics concerns “*what we can say about nature*” rather than nature itself takes on renewed significance in this context. It points toward what Ricoeur (1976) theorized as the hermeneutic circle: the iterative process through which we construct meaning from texts. Quantum formalism constitutes just such a “text,” one requiring not passive reception but active, critical engagement – what Barad (2007: 185) would later conceptualize as “*agential reading*”.

The path forward requires moving beyond mere recognition of these issues to what we might term *hermeneutic engineering*: the systematic development of interpretative frameworks that mediate between mathematical abstraction and conceptual understanding. This approach finds precedent in Fuchs' (2010) QBism, which treats quantum probabilities as “user manuals” rather than objective descriptions, and in Bokulich's (2012) work on semiclassical bridges. What distinguishes our proposal is its comprehensive scope – addressing simultaneously the pedagogical, communicative, and theoretical dimensions of the interpretive deficit through concrete institutional and methodological reforms.

1. The Quantum Translation Council: Institutionalizing Interpretation

We propose establishing an interdisciplinary *Quantum Translation Council* (QTC) modeled on successful science-policy interfaces like the IPCC. This body would:

- *Develop metaphor guidelines* based on cognitive science research (building on work by Thagard, 2022 on analogy in science)
- *Audit public communications* using frameworks like CERN's three-tier system (technical/analogical/popular)
- *Maintain an interpretation registry* tracking how terms evolve across contexts (a “hermeneutic observatory” akin to Galison's (1997) trading zones)

The QTC would differ from traditional standardization bodies by embracing what van Fraassen (2008: 241) terms “*interpretive pluralism within empirical adequacy*.” For instance, it might approve both “quantum states are like musical chords” (for humanities students) and “state vectors in Hilbert space” (for engineers) while requiring clear metadata about each metaphor's relationship to formalism.

2. Interpretive Disclosures: Transparency in Theory

Following the ethical turn in scientific publishing (Resnik, 1998), we advocate for *Interpretation Statements* in quantum physics papers. These would:

- *Declare philosophical presuppositions* (e.g., “This analysis assumes a relational interpretation à la Rovelli (1996)”)
- *Flag metaphorical language* (e.g., “The term ‘quantum jump’ is used heuristically, not as ontological claim”)
- *Identify epistemic limits* (e.g., “The measurement model does not address collapse mechanisms”)

Early adopters in quantum foundations (e.g., the QBism community) already practice this implicitly (Fuchs et al., 2014). Making it systematic would prevent what Laudan (1981) called “argument from ignorance” – where mathematical results are overinterpreted due to unstated assumptions.

3. Curriculum Reform: Teaching the Unsaid

Undergraduate physics education must incorporate what Barad (2007) terms “*agential literacy*” – understanding how concepts shape knowledge production. A proposed *Language and Interpretation* module would:

- *Compare interpretations* of key experiments (e.g., how Copenhagen vs. Many Worlds explain double-slit results).
- *Analyze metaphor migration* (tracing terms like “spin” from classical to quantum usage).
- *Practice epistemic reflection* (writing “interpretation journals” alongside problem sets).

Pilot programs at ETH Zurich (Wüthrich, 2020) show such training reduces what Elby (2001) identified as “formalist fragility” – students’ inability to connect math to physical meaning.

Conclusion: From Interpretation to Integration

Our journey through quantum hermeneutics has traced an essential detour – from exposing the roots of interpretive confusion in metaphor misuse and language limitations, through analyzing successful applications in education and communication, to proposing structural reforms via the Quantum Translation Council and interpretive disclosures. This trajectory reveals that the quantum meaning crisis stems not from inadequate theory, but from underdeveloped interpretive practices. The framework we’ve advanced, building on Collins’ (2010) meaning accounting and Barad’s (2007) agential realism, shows how hermeneutic rigor can coexist with mathematical precision – not by reducing quantum weirdness to classical intuition, but by creating disciplined pathways between formalism and understanding.

The stakes couldn’t be higher: without systematic interpretation, quantum advancements risk bifurcating into technical mastery for specialists and mystical appropriation by the public (Kaiser, 2011). The three actionable steps we propose – institutionalizing interpretation through the QTC, mandating transparency in publications, and reforming curricula – offer concrete ways to honor Bohr’s dictum that clarity of expression must match clarity of thought (Petersen, 1985). These measures don’t complete the hermeneutic project but initiate what should become standard practice: ongoing, collective refinement of quantum meaning-making.

Here, the notion of a *fusion of horizons* (Gadamer, 2004) becomes crucial: as physicists, educators, communicators, and philosophers engage across their disciplinary perspectives, a shared interpretive space emerges – not one that dissolves differences, but one that renders them intelligible and productive. In this dialogical process, the abstract formalism of quantum mechanics gains lived meaning, and the public discourse surrounding it acquires epistemic depth. As quantum technologies transition from labs to society, this interpretive vigilance will determine whether we achieve not just computational advantage, but what might be called *hermeneutic advantage* – the capacity to ethically and accurately integrate quantum insights into human knowledge. The century-long dialogue about quantum meaning now enters its most consequential phase: not just debating interpretations but embedding interpretative wisdom into the scientific process itself.

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Evolution of Human Rights Amid the Postmodern Shift in Political Communication

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The article provides a philosophical overview of the evolution of human rights in the context of the postmodern transformation of political communication. It is shown that one of the key concepts in the modern globalized society is the concept of "human rights", which has an order of different levels according to its historical and socio-cultural development, being referred to as "human rights generation" in socio-political and philosophical theories. The socio-philosophical, legal, and political theories that served as conceptual bases for the development of the rights of the first and second generations are analyzed. The grounds are provided to demonstrate that in the course of the institutionalization of the rights of the third and fourth generations, a postmodern deconstruction of the principles of classical law occurs, as a result, the rights of the third and fourth generations come into conflict with the rights of the first and second generations, as well as with generally accepted legal principles and norms. These processes occur amid the postmodern transformations of political communication in global society, where individual, national, international, intercultural, and other components interact in a complex manner.

Keywords: human rights, political communication, postmodern culture, neoliberalism, globalization.

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Introduction

In a globalized world, the priority of human rights in the structure of social relations has become a defining characteristic of the liberal-legal state, from which human rights are inherently inseparable from the social activities of people and their ways of existence. Being by their nature a normative form of human interaction, human rights: regulate the conditions and ways of life of people; coordinate their actions and activities; ensure the harmonious coexistence of the individual and the state; prevent the conflicts and contradictions in society; contribute to the reduction of social tension associated with the clash of interests of different classes and social formations; serve to achieve integrity, balance and dynamic equilibrium between various elements of the social system, etc.

The universalist legal discourse (formed in the Modern period in Western society) became recognized in many countries of the world. Having ontologized in Western society as the concept of a legal state, the universalist principle of ensuring rights and freedoms subsequently acquired a general civilizational dimension. Since then, the priori norm of any civilized form of political organization of society has been considered a constitutional state, the main functions of which are to ensure the rights to life, liberty, and property of its citizens.

It is worth noting that in postmodern culture, the global integration of universalist political and legal standards and principles has encountered significant contradictions. Subjected to postmodern transformations of political communication, it turned out to be torn apart by a whole series of endogenous and exogenous antagonisms, which manifest themselves in a globalized society in the form of a deepening geopolitical split and the division of the world into leaders and outsiders of globalization (Ordenov & Kleshnia, 2019), as well as the aggravation of several endogenous contradictions associated with eclecticism, fragmentation and deconstruction of modern principles and, as a result, the loss of common socio-cultural developmental guidelines. The aforementioned factors indicate crisis phenomena occurring within the global capitalist system, where we can observe the disruption of fundamental principles related to institutions such as law, civil society, and the nation-state. This, in turn, is caused by the excessive relativization and multidirectionality of discursive practices. In this context, the problem of ensuring human rights in a globalized community is particularly relevant. We hope that our socio-philosophical overview of the issues surrounding the postmodern transformation of human rights will contribute to shaping new approaches to legal understanding, which will take into account the modern features of the political language of communication.

Theoretical foundations of human rights development: classical dimension

The wide range of human rights, as recorded in numerous international legal instruments, is the result of the secularization of consciousness and the historical establishment of the individual's legal status, which occurred predominantly in Western societies. This status has incorporated objective principles that have been developing throughout the history of the Western world. In contrast, the decisive stage in the development of human rights occurred in modern times. In this era, the works of representatives of Western European philosophy such as Voltaire, D. Diderot, C. Montesquieu, J. J. Rousseau, E. Collins, J. Locke, D. Priestley, D. Toland, F. Hutcheson, E. Shaftesbury and others in their works highlighted the rule of law in the context of civil society development, where the concepts of "state" and "law" are

inextricably linked to each other, as well as to ensuring natural human rights based on the principle of egalitarianism.

It is believed that the first acts to enshrine human rights are the acts of English constitutionalism, particularly: Petition of Right (1628); Habeas Corpus Act (1679); Bill of Rights (1689). American declarations, namely – the Virginia Declaration of Rights (1776), the US Declaration of Independence (1776), the US Constitution (1787), and the Bill of Rights (1791) – also contain the norms belonging to the first generation of human rights. In contrast, the French Declaration of the Rights of Man and of the Citizen (1789) had a profound influence worldwide on the establishment of liberalism.

The secularized consciousness of Modernity sought new conceptual frameworks and ideological grounds for its existence, demanding a reevaluation of the anthropological principles of humanity from the standpoint of its self-sufficiency and individual worth. Amid these transformations, a person's moral attitude towards existence also changed: from the ethics of duties, which is inherent in the traditional system of values, there was a transition to the ethics of rights, within which the surrounding reality is understood by modern consciousness as a sphere of an individual's activity application and his freedom exclusively. Freedom itself becomes the antithesis of blind, meaningless will and is understood by the individual as a conscious necessity that must be correlated with reason.

In the Modern era, Western society needs to create conditions that enable individuals to realize their potential capabilities and achieve success in the competitive struggle for access to public goods. These capabilities, while ensuring security and freedom of activity in various spheres of public life, must be legitimized and approved in the form of social norms. In this sense, all social institutions, led by the state, begin to be perceived not in a general sense – as the exclusive good of all or the highest form of human community, but in a utilitarian sense, primarily as a sphere of activity and a means of realizing the interests of an individual. Here, the state is considered a form of social order that guarantees the protection of the rights of an active subject and provides a system for the production and fair distribution of benefits at the institutional level. The highest form of organization of society, where egalitarian justice has emerged in its institutional dimension, is the constitutional state, which, through a system of socio-political institutions (not in isolated cases, but permanently), ensures the rights and freedoms of citizens by its very essence and regardless of the individuals' will.

During this period, D. Locke formulated a liberal definition of equality, which later became a classical one. This is the so-called “legal equality”, the idea of which is that no individual, regardless of their natural endowment, intellectual and physical skills, and abilities, can be excluded from competition or cut off from the free exchange of goods and services. Alternatively, with the same meaning: all people, regardless of their natural inequality, must once and for all be recognized as economically independent subjects who are in a relationship of voluntary mutual use (Ward, 2010). It is this free access of all individuals to competitive struggle that takes the universally recognized form of political and civil rights in a liberal society.

Conceptualization of human rights generations in the socio-cultural dynamics of international political discourse

The concept of generations of human rights emerged in the second half of the twentieth century as an attempt to define categories of human rights evolution in the context of the political transformation of dichotomous elements of socio-cultural dynamics, such as collective and individual, international and national, and negative and positive human rights,

among others. One of the first to draw attention to this problem was Karel Vasak in his work “Human Rights: A Thirty-Year Struggle: the Sustained Efforts to give Force of law to the Universal Declaration of Human Rights”, published in 1977. Modern researchers also recognize the importance of a clear distinction between specific groups of human rights, the mechanisms for ensuring them, and their roles and places in the political system of society (Hannum, 2019: 171).

It should be noted that the fundamental natural, personal, and political human rights, which began to take their shape in the modern era, received the general name “first generation human rights” in the modern period. These include classical liberal rights and freedoms, which were formulated by philosophers in the Age of Enlightenment, namely, the duty of the state to refrain from encroaching on individuality and to create conditions for the full participation of citizens in political life (Ishay, 2008). These are mostly so-called civil liberties, which set the limits of state interference in a person’s private life, including a number of procedural rights, along with political rights and freedoms, in particular: freedom from humiliation of human dignity, torture and ill-treatment by state authorities, unlawful arrest and imprisonment, unfair trial, invasion of privacy, etc. as well as freedom of thought, belief, speech, assembly, movement, participation in the governance of the state, etc. All civil liberties primarily serve to ensure the observance of these personal rights.

Traditionally, the rights and freedoms of the first generation are interpreted as inalienable and not subject to any restrictions under any circumstances. Karel Vasak notes: “The Universal Declaration of Human Rights, like the French Declaration of the Rights of Man and of the Citizen in 1789, has had an immense impact throughout the world. It has been called a modern addition to the New Testament, and the Magna Carta of humanity, and has become a constant source of inspiration for governments, for judges and for national and international legislators” (Vasak, 1977). At the supranational level, these rights are enshrined in the International Covenant on Civil and Political Rights (issued 19 December 1966). Many researchers believe that first-generation negative rights should be considered as direct, if not the only valid, human rights (Ishay, 2008; Donnelly & Whelan, 2018). For example, the next generation of rights is primarily a claim to social benefits provided and redistributed by the state for the benefit of socially vulnerable segments of the population, unlike the rights of the first generation, which are rooted in human nature.

The second generation of human rights arose as a result of the growth of social and economic inequality in society under the influence of industrialization and the intensification of the struggle of peoples to improve their economic situation, which took place primarily in capitalist countries in the late 19th and early 20th centuries (Wellman, 2000: 640). In this way, the concept of social justice is established in society, with the claim that the state should contribute to ensuring a decent existence for citizens under the conditions of economic system development. The second generation of human rights encompasses positive rights designed to deepen personal (civil) rights, ensure the development of socio-economic and cultural human rights (including the right to work, leisure, social security, and medical care), and foster the growth of responsible citizenship.

Despite the fact, that some researchers position second-generation rights as ones corresponding to the ideological doctrines of socialism (Donnelly, 1993: 235), second-generation rights stand out in the international political discourse, which has led to reshaping the concept of “negative” freedom from the point of view of a positive definition, in the context of fair and equal provision in society. At the same time, the positive nature of the expression of second-generation rights indicates a more relative nature, as their provision

depends on the socio-economic capabilities of the state, and most importantly, on the structure – that is, the effective form of collective existence adopted in society. That is why Part 2 of the International Covenant on Economic, Social and Cultural Rights of 1966 states that each State, party to the Covenant, is to undertake (individually and through international assistance and cooperation, in particular in the economic and technical fields) measures within the maximum limits of available resources to ensure the progressive realization of the rights recognized by all appropriate means, including legislative measures.

It is worthwhile noting that there are certain inconsistencies between the rights of the first and second generations, related not only to the forms of their expression. I. Berlin, in his work “Four Essays on Liberty”, expresses the opinion that the positive and negative forms of expression of rights also correspond to a particular political tradition (Berlin, 1990). The first one belongs to the positive understanding of freedom and corresponds to the political tradition, which is based on the ability to be the creator of one’s own destiny, to choose, set and achieve one’s own goals independently, and is revealed by the researcher as the freedom of the individual from the restrictions of the social system within a society (I. Berlin calls this form of expression of rights “freedom for”). The second is characterized as freedom from interference by other people and is associated with the principle of political pluralism, according to which there is a sphere within which a person is allowed to do what they can, to be who they want, without being exposed to interference from other people. This form of expression of rights, in the researcher’s opinion, belongs to “freedom from”.

The principles of “freedom from” proposed by I. Berlin are based on the negative freedoms of the modern age, which stem from the idea of depersonalized power in a free market society. In its most radicalized form, it has acquired a physiocratic dimension. As P. Rosanvallon notes, the physiocrats of the modern age developed a deterministic concept of politics, according to which the laws of the market are the only possible laws of social order and have the same force as physical laws. The physiocrats perceived political relations in their classical sense as a relic of the barbaric state of society, which led them to deny politics and reject history. For them, the absolute grounds for the society’s existence lie outside the temporal dimension and the convulsive course of history. The physiocrats viewed the order that emerged in a free market society as absolute, immutable, and unbreakable; therefore, they did not accept any forms of democracy, public life, or political life that would cause dynamic changes in the social system. Based on this, they also rejected Montesquieu’s system of checks and balances in government. According to P. Rosanvallon, the paradoxical approach of the physiocrats lies in the real return of the political essence they rejected as a global despotism, because the primary duty of the despot is to ensure that politics does not wake up. Moreover, the absolutization of the free-market law lies precisely in the absolutization of despotism, which means the possibility of the complete death of politics (Rosanvallon, 1999).

In the 20th century, the physiocratic approach was further developed by Friedrich von Hayek, Ludwig von Mises, and Isaiah Berlin. Their updated concept of negative freedoms became the basis for the development of neoliberal ideology, where freedom is understood as exclusively economic freedom, implemented according to the physiocratic principle of laissez-faire, i.e., non-interference of the state in the sphere of economic relations. Proponents of the modern concept of non-intervention believe that the collective sphere should be limited to the scope of common goals, namely, economic feasibility. According to their ideas, society is a collection of isolated individuals pursuing their own purely utilitarian interests. The most important thing under these conditions is the state’s non-interference in the economic

activities of individuals who are declared economically independent subjects. It is believed that only in this way can one speak of the existence of true freedom, which acquires a purely economic dimension. At the same time, this point indicates that negative freedom in the neoliberal sense does not belong to the human world at all, but rather concerns economic subjects (*Homo economicus*), that is, business entities – entrepreneurs, enterprises, and organizations, whose activity in society is aimed at realizing their own economic interests. In the globalized neoliberal world, it is they who are free in their activities. Instead, individual freedom is being leveled both in natural-humanistic (negative) and socially-positive meanings.

Hence, the neoliberal understanding of freedom is based on the concept of negative freedom (freedom from), as it is believed to contribute to the continuation of the liberal individualist tradition. This view would be quite relevant if it corresponded to such spheres of life as “private” and “public”, or “individual” and “collective”. It is evident that in such a case, negative freedom will belong to the sphere of the private, and positive freedom to the public. As it may seem, I. Berlin and other supporters of this approach have discovered nothing new, as these trivial truths have been known to humanity since ancient times. At the same time, I. Berlin develops the concept of freedom not according to these principles, but rather in accordance with its political traditions, resulting in a mix of private and public spheres. Then, as S. Fredman notes, referring to this case, the distinction between positive and negative rights is blurred (Fredman, 2006). As a result, the private begins to be regulated by political methods, that is, by the public, and the very understanding of freedom acquires an ideological coloring.

In light of this, we note that H. Arendt always emphasized that the public sphere should be clearly delimited from the private, along with private property and the motives of personal enrichment. In her work “The Human Condition”, she noted that the simple differentiation between the private and the public corresponds to the sphere of the household, on the one hand, and the space of the political, on the other, and these areas have existed as distinct, strictly separated from each other units at least since the times of the ancient city-state (Arendt, 1998). At the same time, in the modern period, economic activity extends beyond the private sphere and becomes a key shared interest. As households leave the private sphere and enter the social space, public life is deprived of its public aspect, and accordingly, the political sphere is also affected. So, according to H. Arendt, the switch of private property interests to the sphere of open and general interest is the beginning of the end of the public. We would add that private life, which was previously everyone’s personal business, also begins to be defined and regulated by the methods of political “pluralism”. Accordingly, not only does the public disappear, but also the private, which in the course of separation and regulation starts to be run by public mechanisms. It is such processes that occur in the course of the shaping of subsequent generations of human rights, influencing their conceptual content.

Historically, the establishment of third-generation human rights occurred in the second half of the twentieth century, and they were shaped by humanistic ideas aimed at consolidating the world’s countries to address issues of collective security and implement strategic plans to overcome humanity’s global problems. The rights of this generation provide for the protection of the interests of an individual who is involved not only in the social community of a particular country, but also in the human community as a whole. The principle underlying this system is considered to be the rights of the first generation, namely that the rights of the community should not limit the rights of an individual. It is assumed that each individual participates in the realization of third-generation rights. Instead, this process is not related to his personal status (as it was assumed in the case of first-generation rights), but rather to his position within society. The peculiarity of these rights is their collectivity, since

they are based on solidarity and the possibility of their provision only through joint efforts (Vašák, 1977: 29). Third-generation human rights include the following universal human rights: the right to development; general security and peace; a clean and safe environment; participation in the utilization of the common cultural heritage of humanity; the right to information and humanitarian assistance, etc. Most of them are purely declarative (especially in the context of the dominance of the capitalist system of production), and their provision is associated with humanistic pathos and a social form of responsibility, which actually makes their implementation impossible in an individualized neoliberal consumer society. In this regard, researchers fairly point out that “The critique adopts the dominant skepticism among western scholars that the third generation of rights confuses the fundamental principles for human rights protection with the demands of various groups and interests, and blends them with vaguely defined political rhetoric, thus bringing an overall negative impact to the international system of human rights protection” (Domaradzki et al., 2019: 427). In addition, the postmodern “cancellation culture” actually nullifies modern principles of development based on the rationalization of historical and cultural heritage, free access to relevant and unbiased information, the pursuit of truth, etc. The activities of the mass media in modern society also do not contribute to the implementation of the declared right to information, as they are mostly aimed at manipulating mass consciousness.

An analysis of modern international political discourse on human rights reveals the presence of paradigmatic shifts that have occurred in this area. In particular, the modern conceptual content of human rights differs from what was present in the political and scientific discourse at the end of the 20th century during the emergence and development of the theory of the three generations of human rights. Firstly, this concerns the revision of the doctrine of solidarity rights to development that existed within the UN until the 2000s, in the context of introducing a new model of expanding the rights through the adoption of political acts as non-binding declarations (Karadzhova, 2002). Also, the modern conceptual content of human rights implies the mandatory existence of rights to protect the interests of minorities, which has taken the form of “humanitarian intervention” as a concept by “Responsibility to Protect” (R2P), which has undermined the modern principle of state sovereignty and at the same time significantly overestimated the expectations of people in the world regarding the rights they have. H. Hannum refers to this overly expanded substantive form of human rights as “humanitarianism,” thereby emphasizing that it encompasses various, loosely connected areas (Hannum, 2019: 134). It also suggests that the current conceptual content of human rights does not align with the existing framework of the three generations of human rights theory.

Considering the aforementioned, researchers have begun to distinguish between the fourth and some even the fifth generation of rights. The development of the fourth generation of human rights is associated with the scientific and technological development of humanity, in particular with the development of information and communication technologies, biomedical technologies and genetic research (Albuquerque, 2014; Raposo, 2016), as well as robotics (Robertson, 2014), which led to the emergence of some moral and ethical problems, such as: cloning, transplantation, euthanasia, the ethics of artificial intelligence (Stezhko & Khmil, 2023), etc. This approach left a corresponding imprint on the content of the rights themselves, where researchers include: the right of a person to individuality and sovereignty over the state; to change gender; to use virtual reality; same-sex marriage; independent life according to religious and moral views; the right to die (so-called somatic rights); the right of a person to own and control his or her body; the right to physical freedom; rights related to cloning and other discoveries in the field of biology; information rights and technologies; the right to

euthanasia and organ transplantation; the right to cloning; artificial insemination; a child-free family, etc. (Barabash et al., 2024).

It should be noted that most of the fourth-generation rights listed above have never been part of the public sphere and have not been subject to social regulation (except same-sex marriage in some societies, particularly in the context of its prohibition). Such regulation of a purely private sphere by the public one deprives people of the right to live a full personal life. Under such conditions, people are encouraged to submit their personal affairs to the public, and the public, in turn, must respond in an appropriate “tolerant” manner. The fact that so-called fourth-generation rights interfere in the most intimate existential spheres of a person, deciding on matters of life and death, as well as changing human nature, also raises concerns.

Instead, despite the existing contradictions in the content and forms of the generations of human rights we have considered, they are all the result of the objective general civilizational development of humanity and, at the same time, the political and socio-cultural interaction of different societies in the international arena. They act as a complex information and sign system in which individual, national, international, and other components of the political language of communication interact. That is why in the modern period, a large number of states have not only signed international agreements on the protection of human rights, but also included provisions on their protection in their national development doctrines. In this way, the principle of human rights protection became one of the imperative norms of international law. However, in its practical dimension, the category of human rights proved not to be as universal as to be perceived as an absolute common denominator for all states in the world. This is due to the diverse socio-cultural and historical experiences of peoples and regions, as well as the specific dimensions of religion and traditions that have historically evolved in different societies, and the presence of several contradictions within the human rights system itself. This is also not facilitated by the policy of double standards that exists in modern international relations, when human rights serve as a tool for manipulation and pressure by strong, economically developed states on weaker ones, for example, in the context of implementing the concept of “humanitarian intervention” (Responsibility to Protect), according to which democratic states not only have the right, but also the obligation to intervene in the affairs of other states to protect human rights, regardless of the latter’s sovereignty. The result is real cases of mass human rights violations in the course of the destruction of entire regions and countries.

Postmodern transformations of human rights generations

Ensuring human rights and freedoms has always been a complex and controversial topic. Contemporary human rights discourse increasingly turns to reviewing axiological legal principles through the prism of postmodern critical theory (Wang, 2013), which aims to deconstruct the classical humanocentrism position (Kymlicka, 2018) in the context of sentiocentrism (Baldissone, 2010). All the aforementioned significantly transform the nature of human rights discourse in international political communication. Whereas in the modern period, human rights, which were initially formed within nation-states, made their way to the international level, states must now a priori integrate an expanded list of rights produced by international human rights organizations into their national legislation.

Thus, in the context of postmodern culture, the issue of human rights is being actualized with renewed force, as modern culture generates its own contradictions and disagreements, superimposing them on already existing ones that were developed by modern culture in conjunction with classical rights and their principles. In particular, during the

institutionalization of third and fourth generation rights, the deconstruction of classical legal principles occurs, resulting in conflicts between the third and fourth generations and the first and second generations of rights, as well as with generally accepted classical legal principles and norms.

It is not difficult to trace the connection between these aspects and law, as well as the peculiarities of its understanding in postmodern culture. Thus, Postmodernism and law appear to be in apparent conflict because postmodern culture is aimed at “grasping,” deconstruction, and further multiple reproduction in images, symbols, and cultural codes of various objects and phenomena. In contrast, law is based on logic, expediency, universalism, and the laws of social development. Postmodernism undermines the natural and inalienable principles and values of humanity from a legal perspective, and law itself undergoes changes that alter its perception. This perception, due to the “postmodernist sensitivity” (Lyotard, 1995), is no longer based on reason, but on feelings. Moreover, in a postmodern society where citizens are increasingly aware of their rights due to informatization, there is a simultaneous threat of frivolity and neglect of one’s duties, which corresponds to the general state of modern culture.

The legitimation of customary norms in the postmodern period occurs through the regulation of the conduct of discourse, because in the conditions of the rhizome of signs and meanings, the intertextuality and intersubjectivity of the argumentation practice, norms are a priori recognized as constructivist assumptions, the assessment of which can be given only hypothetically. This gave J. Baudrillard grounds to consider the social system as one derived from a sign system, the unit of which is the “simulacrum.” In his opinion, simulation is dangerous because at any moment it allows one to make the assumption, outside its subject, that order and law themselves may be nothing more than a simulation (Baudrillard, 2024). It is about the postmodern power of signs and the systems that produce them. According to the philosopher, domination through sign systems alters the strategic goals of modernity, shifting from the process of production, profit, and exploitation to the postmodern manipulation of signs, meanings, and consciousness. Signs, in the process of simulation, going away from their referents, turn into “simulacra” that reproduce and transmit meanings that do not correspond to real events and situations. As a result, a gap occurs between the sign and reality.

In this context, it is interesting to trace the changes that have occurred in the law from the perspective of the concept of human rights “generations”. We have noted above that the first generation of human rights recognizes the fundamental liberal values determined in Western countries during the bourgeois movement. First-generation rights reflect the so-called negative freedom – “laissez-faire”, within which freedom is understood as the absence of coercion, obliging the state to refrain from interfering in the private sphere and creating conditions for citizens to participate in public life only. The connection of first-generation rights with social practice was so obvious that this mediation of basic rights by social relations formed the basis of the Marxist theory of the basis and the legal and political superstructure.

Second-generation human rights are rights in the socio-economic and cultural spheres. These rights were already based on a positive understanding of freedom, that is, freedom whose real possibility of realization was determined by the established norms. Furthermore, although the rights of the second generation were based on the rights of the first, were supposedly their logical continuation and could be ensured only if “there are conditions under which everyone can enjoy his economic, social and cultural rights, as well as his civil and political rights” (International Covenant, 1966), they constituted a specific synthetic construct, because they were derived not from the system of social relations, but theoretically, from another abstract construct – fundamental human rights.

The next generation of human rights demonstrates even greater artificiality and detachment from the real system of relations. It is evident that their arrival is the result of radical social construction, because each of the elements of third-generation human rights is built on idealized principles of humanism and correlates with reality only through an objectified and institutionalized system of fundamental rights. As P. Berger and T. Luckman aptly noted, the social order is created by humans in the process of constant externalization (Berger & Luckman, 1967). However, in the modern era, the constituent element of social reality was knowledge that correlated with reality and, through this, received its legitimation. In the postmodern era, factual reality is opposed to an ideal image, detached from its referent, and the procedural nature of discourse becomes the factor that legitimizes it. This discourse determines the way of organizing existence according to the pre-set rules. The obvious constructivist vector in first-generation rights is replaced by poststructuralist deconstructivism in subsequent generations of rights (especially in fourth-generation rights). This is because in the world of poststructuralism, the dominant notions of practice are seen not as sensory-objective forms of life, but rather as discursive practices, that is, actually closed within the boundaries of consciousness. The poststructuralist imposition of a new meaning on any phenomenon of material or spiritual reality means subordination to this “new content”.

As a result of the fact that different variants of poststructuralist thought were given in an attempt to comprehend the “inversion” of structure, the place of impersonal logic was taken by the emotional sphere, the legal order was replaced by formalism, and logical certainty and integrity by heterogeneity and fragmentation. At the same time, one side of postmodern legal consciousness has absorbed what could be called the “metaphysics of desires” (pulsations, intensity, energy), and the other side has absorbed specific pluralized differences (singularities, particularities). This paradigm positions further development as one that is associated with the deconstruction and reshaping of the already existing notions and concepts. Therefore, to eliminate the axiological foundations of modern culture becomes a kind of postmodern program.

This program is a relevant tribute to communitarianism, as it is a basis for a supralocal hyperregulated capitalism model, which assumes that relations between elements are based on a formal hierarchy. Within the framework of the concept of the international regime, the model of a vertical organizational structure, proposed as a specific instrument of global politics, neutralizes classical democratic and liberal-legal values. In this regard, J. Habermas noted that the member states of the European Union lost a significant part of their democratic substance in the course of European unification. Most significant and numerous political decisions are made in Brussels and reach nation-states only by being “transplanted” into the soil of national law. The entire process takes place without involving the public of the member states of the European Union. However, European citizens can have their say only here: there is no pan-European public (Habermas, 2010). J. Habermas explains this deficit of democracy as the shortcomings of the internal political system of Europe. At the same time, this problem concerns not only the European space, as this model of decision-making is positioned as global within the system of international relations.

Thus, postmodern culture produces several hybrid socio-cultural forms in a global dimension: vertically regulated neoliberalism with social norms; formally existing synthetic human rights that have no ontological dimension and are not ensured with real means of implementation and control; an uncompromising demand for compromise embedded at the systemic level, which is embodied as a relativistic universal and supra-historical global order. These forms were reflected in postmodern philosophy, which advocates for the glorification of

carefree pluralism, the conviction in the mutual unproductiveness and “untranslatability” of different forms of life, with an emphasis placed on dispute rather than agreement. Moreover, although postmodern axiology is embodied in a new, nonconformist attitude towards races, gender, cultures, and minorities, at the same time, amid the contradictions with traditional views on classes, relations between women and men, family values, and spiritual orientations, new conflicts arise in the modern world, being predominantly mental by their nature. In this way, the pluralistic model of Postmodernity causes a decentralization of social and cultural ties, which also manifests in the sphere of human rights in the form of normalized tolerance of abnormality.

Conclusions

Human rights are inherently inseparable from people’s social activities and ways of being. The concept of human rights, which emerged in the modern era in Western society, has gained recognition in many countries around the world. However, the global integration of universalist political and legal standards has encountered apparent contradictions. These contradictions have arisen between the rights of the first and second generations, particularly in relation to their positive and negative expressions. Generally, denial of the classical principles and norms of human rights stems from the declarative nature of the rights of the third generation, as well as the synthetic and artificial nature of the fourth, through political “pluralism” interfering with the regulation of the personal, private sphere.

Given that the postmodern era is characterized by uncertainty, lack of meaning, simulativity, rhizome, etc., the rationalized construct of generations of human rights during this period loses its conceptual dimensions, eliminating the possibility of their implementation and negatively affecting a person’s legal capacity. Postmodern opposition to modern attitudes in the context of political communication is increasingly taking on a manipulative form of usurpation and totalitarianism, as it is used to deconstruct the social narratives of modernity and impose post-narratives that are destructive and asocial by nature. Under the conditions of insecurity of the rights of the first and second generations, synthetic rights of the third and fourth generations have become examples of the imposition of such “post-narratives”.

Instead, despite the existing contradictions in the content and forms of the generations of human rights we have considered, they are all the result of the objective general civilizational development of humanity and, at the same time, the political interaction of different societies. In particular, they act as a complex information and sign system in which individual, national, international, and other components of the political language of international communication interact.

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The Examination of Anomalous World Experience: Implementation of Phenomenological Interview in the Context of Modern Ukrainian Culture

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This research examines the application of the Examination of Anomalous World Experience (EAWEx), a semi-structured phenomenological interview, within the clinical context of contemporary Ukraine, especially during wartime. The study's primary hypothesis is that the EAWEx offers superior diagnostic accuracy in differentiating schizophrenia spectrum disorders (SSD) from post-traumatic stress disorder (PTSD) with psychotic symptoms, compared to traditional methods.

The authors argued that phenomenological psychopathology, unlike dominant operationalist approaches, overcomes significant epistemological gaps by focusing on the patient's subjective experience and sociocultural context. The EAWEx's categorical framework meticulously analyses fundamental structures of experience (space, time, and intersubjectivity) to distinguish the systemic disintegration of the lifeworld in SSD from the more past-focused disruptions of PTSD. A clinical case study confirmed the EAWEx's high differential-diagnostic value.

The authors concluded that integrating the EAWEx into Ukrainian clinical practice is both timely and promising, but requires a systemic approach. Recommendations include developing a Ukrainian-language glossary of phenomenological concepts, creating training programs for mental health professionals, and adapting the methodology to the unique historical and cultural context, including

combat-related trauma. This approach not only improves diagnostic accuracy but also humanizes psychiatry by centring the patient's unique lifeworld and fostering a deeper therapeutic alliance.

Keywords: phenomenological psychopathology, anomalous world experience, phenomenological interview, schizophrenia, traumatic experience of Ukrainian culture.

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Introduction

Background.

Traditionally, anomalous experience has been considered a subject for neuroscience, clinical psychology, and psychiatry. Over recent decades, the range of disciplines engaged in a thorough study of anomalous experience has expanded due to the interaction of neurosciences with phenomenological psychopathology (Acunzo et al., 2013).

The American Psychological Association (APA) Dictionary defines anomalous experience as any of a variety of experiences that seem inconsistent with commonly accepted explanations of reality (American Psychological Association, 2018). Anomalous experiences are changes in perception that can be explained as possible hallucinatory symptoms (the clinical model) or as a way of representing reality in accordance with the beliefs of each individual person (the cognitive or phenomenological model) (Escola-Gascón & Gallifa, 2020: 115).

In traditional psycho-psychiatric practice, anomalous experience is considered the presence in an individual of states and phenomena (in psychiatry, the term “symptoms” is more commonly used) that are more characteristic of psychotic disorders. These are disorders that either add (“positive”) or subtract (“negative”) components of an individual’s mental activity, thereby radically changing their way of perceiving the surrounding reality and representing themselves, as well as the results of their mental processes within this reality. Such mental and behavioral disorders most often include schizophrenia spectrum disorders, bipolar affective disorder, and delusional disorder (Coutts et al., 2023: 222). Most often, people who have experienced anomalous phenomena report phenomena that, according to the classifications in the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5) and the International Statistical Classification of Diseases and Related Health Problems 10th and 11th Revisions (ICD-10, ICD-11), can be classified as hallucinations that occur in various sensory modalities (auditory, visual, tactile hallucinations, etc.) (Rabeyron & Loose, 2015). These subsequently form a diagnostic framework, along with other symptoms, for a particular mental and behavioral disorder as outlined in the aforementioned classification systems.

The basis of such a classification of mental and behavioral disorders lies in two approaches: biological objectivism and operationalism.

Biological objectivism involves considering mental and behavioral disorders solely from the perspective of their organic nature (Wilkinson, 2022b: 106). That is, does the person currently suffering from a mental disorder have significant physical changes in the structure of organs and systems, or disruptions of their physiological mechanisms, that could be the cause of the symptoms identified during a psychiatric examination? The fundamental principles of biological objectivism, such as the role of genetics, neurochemistry, brain structure, and other biological factors in the development and manifestation of mental illnesses, are widely used in modern research on the nature and development of mental disorders (Schwartz & Corcoran, 2009: 64). Its role is to support the biological basis of mental disorders through

empirical research, without relying on subjective interpretations of the patient's condition from their own perspective or the perspective of the examining physician, or any other social constructs (Roberts & Wilkinson, 2025). As a result, this provides a "scientific justification" for the existence, diagnosis, and treatment of mental disorders, as is accepted in other medical disciplines, and reduces the marginalization of psychiatry.

In turn, operationalism is intended to make the diagnostic process for mental and behavioral disorders valid, reliable, standardized, and unified (Feyaerts & Thornton, 2020: 665). It involves using clear criteria and instructions for defining mental disorders, which helps to reduce the influence of subjective factors in the diagnostic process (Moe & de Cuzzani, 2022: 707). This approach to the classification and diagnosis of mental and behavioral disorders was first proposed for use in the DSM-III. Psychiatrists were provided with precisely defined combinations of all possible symptoms to identify approximately 300 possible nosological units, which ensured the reliability of each diagnosis made in the future (Horwitz, 2021: 64). Gerald Klerman described this important step in the methodology of classifying mental disorders at the time as: "The reliability problem has been solved" (Clementz, 2023).

However, almost immediately, the new approach met with critical remarks from the scientific community. A critical analysis of operationalism in psychiatry required an understanding of its profound philosophical and clinical consequences. Thus, the operational approach was criticized for oversimplification and loss of meaning in the description and subsequent diagnosis of mental disorders.

Among the critical remarks were those concerning the excessive reduction of mental disorders to "no more than a collection of observable symptoms" (Lovett & Hood, 2011: 207). This approach relegates internal mechanisms and contextual variables that shape an individual's unique experience of mental illness to the background, thereby neglecting the subjective phenomenological dimension of this experience. Such an approach can create an illusion of homogeneity in clinical categories by ignoring the diversity of biological, psychological, social, and cultural determinants that interact within complex psychopathological processes.

The isolated focus of operationalism leads to practical and ethical risks in the direct practice of clinical psychiatry. This is reflected in challenges with early diagnosis, such as the detection of atypical symptoms or the prodromal period (a phase characterized by features of a mental state that indicate a change from a person's previous functioning, prior to the emergence of overt signs of a mental disorder) (Addington, 2003: 94); and insufficient timely attention to comorbid conditions (the simultaneous presence of two or more mental disorders in a single individual) (Gould et al., 2017). Furthermore, patients with "inter-criterial" or "subthreshold" presentations of mental and behavioral disorders are at risk of being overlooked by the diagnostic system because their unique lived experience does not fit into rigid diagnostic frameworks (Rodríguez et al., 2012). These issues have received particular attention in the context of diagnosing and treating schizophrenia spectrum disorders (Clementz, 2023).

Therefore, the aim of our study is to implement, validate, and determine the reliability of the semi-structured phenomenological interview Examination of Anomalous World Experience (EAWEx) in the context of Ukrainian culture, considering the specifics of the state of war.

Within this study, we hypothesize that the semi-structured phenomenological interview Examination of Anomalous World Experience (EAWEx) demonstrates higher diagnostic accuracy and reliability in detecting schizophrenia spectrum disorders (SSD) compared to a traditional clinical (psychiatric) interview. It is expected that the semi-structured phenomenological interview, the Examination of Anomalous World Experience, can reduce the number of diagnostic inaccuracies or errors when diagnosing SSD and post-traumatic stress

disorder (PTSD) with “positive” symptoms. It is also assumed that the phenomenological method can be effectively integrated into the practice of clinical psychology and psychiatry, considering the cultural and semantic peculiarities of modern Ukrainian culture.

One of the main critical positions regarding standardized diagnostic practice in clinical psychiatry is that classification criteria do not reflect the rich and broad experience of mental illness among people with mental and behavioral disorders, and they give insufficient attention to the peculiarities of the cultural practices of which these individuals are agents.

Through explicit and implicit mechanisms, the cultural context shapes and determines which experiences are considered normative and which are anomalous, whether they indicate pathology, and whether mental phenomena correspond to the signs of a psychotic disorder within a specific culture (Cardeña et al., 2014: 5). Research shows that cultural variables within ethnic groups, individualistic or collectivist life philosophies, historical and generational trauma, immigration and acculturation, religious practices, and gender roles all influence the etiology, semiology, epidemiology, assessment, diagnosis, and treatment of mental disorders, as well as the management of health services (Cardeña et al., 2017: 13; Hualparuca-Olivera et al., 2024: 25).

Anomalous experiences are ontologically significant events that are mediated by language and communication, inseparably linked with interpersonal interactions, and reflect a broader historical and cultural context. Qualitative analysis of such events or experiences can deepen the understanding of basic psychological and social-psychological processes (Murray & Wooffitt, 2010: 1). Furthermore, the importance of the cultural and religious environment in the dynamics of the psychopathological experience of patients with anomalous experiences is emphasized (Martins et al., 2022).

Thus, biological objectivism and operationalism, despite their role in unifying diagnoses and standardizing research on mental disorders, create several systemic shortcomings due to an excessive emphasis on formal signs. First, they can overlook prodromal symptoms, which further complicates early diagnosis. Second, they neglect the patient’s individual history and socio-cultural determinants. By focusing exclusively on “objective” markers (a spectrum of observable behavioral, cognitive, and affective deviations), these approaches risk reducing a person’s unique lifeworld to a set of diagnostic criteria. As a result, an epistemological gap arises, where formalized symptoms fail to capture the patient’s subjective reality, which undergoes a fundamental transformation during the development of a mental disorder.

It is at this point that phenomenology opens new perspectives. As a philosophical movement and research method, phenomenology calls for a focus on the direct, pre-reflective experience of how phenomena appear in consciousness (Drożdżowicz, 2020: 699). In a psychopathological context, the phenomenological approach does not seek to explain a disorder from the standpoint of neurobiology or psychodynamics. Instead, it aims to describe and interpret the altered structure of the lived experience of an individual with mental and behavioral disorders. It analyzes the transformation of the fundamental coordinates of human existence: space, time, causality, intersubjectivity, and embodiment. Thus, phenomenology complements operational criteria with a deeper understanding of the subjective dimensions of a mental disorder.

Phenomenological Philosophy.

Phenomenology represents one of the most influential philosophical movements of the modern era, which has fundamentally transformed humanitarian discourse. The symbolic slogan of this movement, proclaimed by its founder Edmund Husserl, – “To the things

themselves!” (Zu den Sachen selbst!) – is a call to discard preconceived concepts and turn to pure, immediate experience (Moran, 2019). Phenomenology is defined in two interconnected senses: as a philosophical discipline that focuses on the description and analysis of experience, and as a historical movement in the development of continental philosophy. As a discipline, phenomenology can be defined as the systematic study of the structures of consciousness and experience. Phenomenology seeks to elucidate how objects are perceived “from within”, from a first-person point of view, and what meaning they acquire in immediate experience. Thus, its task is to describe the essential modes of being of phenomena, excluding indirect interpretations and turning to the “things themselves” (Smith, 2018).

Phenomenology as a formalized intellectual and historical movement in 20th-century continental philosophy emerged from the works of the German philosopher Edmund Husserl (1859-1938) – the “father of phenomenology” (Steinbock, 2019). Husserl expressed concern about the crisis of European sciences, which, in his conviction, had lost their epistemologically reliable foundation. His ambition was to transform philosophy into a “rigorous science” capable of providing an apodictic basis for the entire body of human knowledge. To this end, he developed a unique methodology – the phenomenological method. The phenomenological method should be regarded not as a collection of dogmatic tenets but rather as a procedural apparatus for the analysis of consciousness.

Central to Husserl was the concept of intentionality. This concept was borrowed from his teacher, Franz Brentano, according to which consciousness is always “consciousness of something” (Jacob, 2023). Any act of consciousness (perception, reflection, judgment) is directed at an object. Husserl developed this idea into the correlative structure of “noesis-noema”: noesis denotes the intentional act of consciousness itself, while noema is the object given in that act (Rassi & Shahabi, 2015, 31). The goal of transcendental phenomenology was to map these intentional structures through which consciousness performs the “constitution” (the giving of meaning) of the world.

Husserl’s phenomenology can be briefly characterized as a method for investigating the essence of the structure of consciousness. In turn, phenomenology understands consciousness as the fundamental mode of being in a waking state, which underlies the manifestations of corresponding objects of human sensory perception, imagination, and thought. Therefore, the meaning of “object” in Husserl’s phenomenology is not limited to objects perceived by sensory perception. It encompasses everything that has a sufficiently stable identity to be able to reappear, which is why Husserl also considers the phenomena of imagination and thought that meet this criterion to be objects (Hopkins, 2020: 509).

Edmund Husserl pioneered descriptive phenomenology as a method aimed at the unbiased reproduction of an individual’s lived experience on the part of the researcher. This approach involves uncovering the essence of phenomena through a detailed analysis of how participants experience, perceive, remember, and make sense of their daily lives, without the inclusion of the researcher’s own interpretations.

Martin Heidegger (1889–1976), a student of Husserl, is the founder of interpretive phenomenology, also known as hermeneutics. Unlike Husserl, Heidegger emphasized that it is impossible to separate the researcher from the process of interpretation, as understanding is influenced by the researcher’s prior knowledge, assumptions, and context. In interpretive phenomenology, researchers engage in a “double hermeneutic” process: the participant makes sense of their lived experience, and the researcher, in turn, interprets how the participant understands that experience. Interpretive phenomenological research encourages researchers

to reflect on their own experiences and use them to deepen their interpretations (Tavakol & Sanders, 2025: 2).

Thus, in contrast to descriptive phenomenology, interpretive phenomenology acknowledges that complete objectivity is unattainable, and researchers actively construct meaning during their analysis.

In the late 20th and early 21st-centuries, phenomenology has continued to develop and expand its scope of application in various fields of research.

The results of such scientific developments have been projects in critical phenomenology, feminist phenomenology, and phenomenological psychopathology.

Critical phenomenology synthesizes the phenomenological method with critical theory to analyze the experience of social oppression (Dyring, 2025). Its purpose is to investigate how social structures (racism, sexism, colonialism) shape basic, pre-reflective experience. The object of analysis is how the “racial” or “gendered” body experiences itself in a hostile public space, and how prejudices are incorporated into the very fabric of perceptual experience.

Feminist phenomenology combines the analysis of women’s embodied experience with a critical re-evaluation of classic phenomenological methods. On the one hand, it examines how social norms limit women’s sense of space, kinetic possibilities, and the mediation of sexuality, race, economic status, ethnic identity, and disability. On the other hand, at the heart of feminist phenomenology are two complementary strategies: a critical engagement with the texts of Merleau-Ponty, Heidegger, and Husserl, which reveals their bias towards a “universal” subject (the privileged white male), and a creative re-thinking of these phenomenological methods to highlight and disseminate feminist perspectives on experiences that have long been neglected by traditional philosophy (Ryman & Fulfer, 2013).

Types of Phenomenology.

In the 20th century, seven types of phenomenology emerged, as described in the *Encyclopedia of Phenomenology* (Smith, 2018):

1. Transcendental constitutive phenomenology studies how objects are constituted in a pure or transcendental consciousness, setting aside questions about any connection to the surrounding natural world.
2. Naturalistic constitutive phenomenology studies how consciousness constitutes or perceives things in the natural world, proceeding from the natural attitude that consciousness is part of nature.
3. Existential phenomenology studies concrete human existence, including our experience of free choice or action in specific situations.
4. Generative historical phenomenology studies how the meaning we find in our experience is generated in historical processes of collective experience over time.
5. Genetic phenomenology studies the genesis of the meanings of things within one’s own stream of experience.
6. Hermeneutic phenomenology studies the interpretive structures of experience how we understand and interact with the things around us in our human world, including ourselves and others.
7. Realistic phenomenology studies the structure of consciousness and intentionality, assuming that it takes place in a real world that is largely external to consciousness and is not in any way generated by consciousness.

Philosophy of Psychiatry.

The philosophy of psychiatry is a field of interdisciplinary interaction between two sciences that are called upon to complement, study, and improve one another. The variety of approaches to defining this field necessitates a structured analysis of its main characteristics and directions of development.

Under the broad category of philosophy of psychiatry, two rather different types of activities can be distinguished, which correspond to different ways in which philosophy interacts with psychiatry and are characterized by different directions of influence between these disciplines.

On the one hand, the philosophy of psychiatry can involve a philosophical analysis of psychiatry as a science and a practical activity. Practical activity here should be understood as its dichotomy into two types: direct interaction with a person suffering from mental and behavioral disorders in a clinical context for the purpose of therapeutic interventions (pharmacotherapy, psychotherapy), and fundamental or applied research on mental disorders with the aim of deepening and expanding knowledge about them. Such research, in turn, can be purely medical or non-medical. Purely medical research aims to study the causes of mental disorders, develop effective treatment methods, and improve prevention strategies, which involves studying the structure and functions of the brain and conducting clinical trials (National Institutes of Health, 2007). Non-medical research is primarily the study of the social determinants of health (the role of socio-economic conditions, feelings of support or, conversely, isolation and loneliness, as well as the consequences of stigma and discrimination against individuals with mental disorders, the study of the role of cultural and religious practices on the motivation to seek help, the role of digital technologies in supporting or worsening the condition of individuals with mental disorders, as well as the effectiveness of online therapy and other digital interventions, etc. (Baber, 2023: 587).

In the aforementioned case, the direction of influence is from philosophy to psychiatry, where philosophical methods and concepts are applied to improve psychiatric knowledge. On the other hand, a significant part of the philosophy of psychiatry involves the opposite direction of influence from psychiatric phenomena to philosophy, exploring what various mental disorders can tell us about fundamental philosophical theories (Wilkinson, 2022a: 2).

An important question is to define the place of the philosophy of psychiatry in the general structure of philosophical knowledge. While it may seem at first glance that the philosophy of psychiatry is merely a branch of the philosophy of medicine (since psychiatry is traditionally considered a medical discipline), such reasoning is a gross misinterpretation of the relationship between these fields (Wilkinson, 2022a: 5).

The current state of philosophical knowledge demonstrates that the philosophy of psychiatry, with all the conceptual questions that arise when considering the mind and its relationship to the brain, body, and physical and social environment, is actually a more extensive discipline. It is more accurate to view the relationship between the philosophy of psychiatry and the philosophy of medicine as an overlap of categories, rather than a subset-to-set relationship (Wilkinson, 2022a: 5). Some philosophy of psychiatry deals with medical issues, but a significant portion of it goes beyond purely medical problems.

The philosophy of psychiatry proves to be necessary for various categories of researchers and practitioners. Philosophers need the philosophy of psychiatry because concepts such as action, character, rationality, responsibility, and personality are central to both everyday life and various contexts and disciplines of philosophy. Since the normal functioning of mental faculties (desires, emotions, memory, sense of self-identity) is necessary for living life as a human person, psychopathology and mental disorders in which this normal functioning is

disrupted not only cause profound problems in everyday contexts of action but also raise fundamental philosophical questions about the structure of being a subject of mental states, a person, or a responsible agent (Quante, 2008: 486).

At the same time, scientists and therapists need the philosophy of psychiatry for similar reasons – they must use the core concepts that describe mental capacities in abnormal contexts and cases. The philosophy of psychiatry is needed not so much because it can offer better or new concepts of mental phenomena, but because philosophers can help “challenge presumed truths” by which psychiatrists are guided in their professional activities as scientists and therapists (Quante, 2008: 486).

A separate contentious issue in the philosophy of psychiatry is the definition of the scope of agents whose activities should be subjected to analysis. This circle unquestionably includes people with diagnosed mental and behavioral disorders and mental health specialists, psychiatrists and medical psychologists, while the inclusion of general psychology specialists, psychotherapists, and clinical psychologists in this circle is debatable (Wilkinson, 2022a: 4). This context is particularly relevant for Ukrainian mental health care practice. This is because, until recently, legislation did not regulate and define the activities of psychologists, clinical psychologists, and psychotherapists. Currently, the reference book of qualification characteristics of professions for employees sets out requirements for the educational level and professional competencies of clinical psychologists and psychotherapists as professionals with higher non-medical education in psychological and spiritual care in the field of healthcare (Reference book of qualification characteristics of professions, 2025). In turn, the activities of psychologists are regulated by the law “On the Mental Health Care System in Ukraine” (About the Mental Health Care System in Ukraine, 2025). Based on the above, it should be stated that, in the context of further research on the philosophy of psychiatry in Ukrainian philosophical culture, the issue of defining agents has already been formally determined at the legislative level.

In general, the ongoing discussions initiated and continued by philosophy regarding mental disorders and psychiatry itself as an independent medical discipline can be systematized into three main groups. First, there are topics that arise when considering psychiatry as a special science using the methods and concepts of the philosophy of science (analytical philosophy of science), including questions of explanation, reduction, and classification (Fellowes, 2025). Second, there are conceptual questions related to attempts to understand the very idea of mental illness and its ethical and experiential aspects. Third, there are interactions between psychopathology and the philosophy of mind, where philosophers use clinical phenomena to illuminate questions of the philosophy of mind, and philosophical conclusions are applied to the understanding of mental illnesses (Murphy, 2025).

Thus, the philosophy of psychiatry emerges as a complex interdisciplinary field characterized by a multi-directional influence and a wide range of issues, covering both theoretical questions of the philosophy of science and practical aspects of clinical activity.

Phenomenological Psychopathology.

Conventional psychopathology in psychiatry focuses its research on the study of abnormal mental states. In the system of education for mental health professionals and according to the tradition of psychiatric schools in Ukraine, psychopathology is divided into general and special (On the approval of model training programs for internships in the specialties of “Obstetrics and Gynecology,” “Internal Medicine,” “Pediatric Surgery,” “Epidemiology,” “Neurology,” “Ophthalmology,” “Orthopedics and Traumatology,” “Pediatrics,” “Psychiatry,” “Surgery,”

“Dentistry,” “Medical Psychology,” “Emergency Medicine,” and “Infectious Diseases”, 2022; Gavenko et al., 2020: 71, 147).

General psychopathology studies the general regularities of the emergence, development, and manifestations of mental disorders, regardless of their specific nosological unit. In other words, it investigates the basic patterns of the manifestation and development of mental pathology that are common to many mental illnesses, as well as general questions of etiology (causes of occurrence) and pathogenesis (mechanisms of development).

In turn, special psychopathology studies individual nosological units, their causes (etiology), mechanisms of development (pathogenesis), manifestations (clinical picture), developmental patterns, as well as methods of treatment and restoration of working capacity. It focuses on specific mental disorders, in contrast to general psychopathology, which studies the general regularities of mental disorders.

In contrast to the Ukrainian context of psychopathology, such a division of psychopathology is not distinguished in the scientific system of psychiatry in the countries of Western Europe, Great Britain, and North and South America. Instead, psychopathology is divided into descriptive and experimental.

Descriptive psychopathology provides an objective description of anomalous mental states, attempting to avoid preconceived notions or theories about mental disorders and limiting itself to describing conscious experiences and observable human behavior. The goal of descriptive psychopathology is to clarify the fundamental qualities of pathological mental experiences and to understand each patient's individual experience of their illness. Therefore, it requires the ability to detect, identify, and interpret the symptoms of mental and behavioral disorders, and as such, it is a key element of clinical practice, even being called the “foundational professional skill of a psychiatrist” (Denys, 2024: 235). It is also referred to as phenomenology or phenomenological psychopathology, hence descriptive psychopathology is something more than mere symptomatology (Harrison et al., 2017).

Experimental psychopathology focuses on empirically measurable and verifiable conscious psychological processes, using experimental methods such as cognitive and behavioral psychology and functional brain imaging techniques. For example, there are cognitive theories on the origins of delusions, panic attacks, and depression (Harrison et al., 2017). Although experimental psychopathology deals with the causes of symptoms, it is usually conducted within the context of the syndromes in which these symptoms arise.

Thus, psychopathology traditionally serves as a fundamental component of psychiatry, as it facilitates the conversion of a patient's subjective experience (from a first-person perspective) and the observable manifestations of their behavior into clearly defined symptomatic categories (from a third-person perspective) (Drożdżowicz, 2020: 685). Because of this, psychopathology serves as a tool for coding individual experiences into formalized information, which is subsequently used in diagnostic algorithms, the planning of therapeutic interventions, and scientific research. As a theoretical approach, it includes a phenomenological analysis and description of the patients' internal experience and expression of mental illness, which involves systematic reflection (Drożdżowicz, 2020: 685). Despite the historically important role of phenomenology in the deeper understanding of mental disorders and the development of their treatment methods, recent decades have been marked by significant transformations in the practical and scientific paradigm of modern psychiatry.

The publication of Karl Jaspers's “General Psychopathology” in 1913 became the formal date of the founding of phenomenological psychopathology. Although Jasper himself never

considered himself a phenomenologist, his work laid a solid foundation for the study of the lived experience of mental illness from a first-person perspective (Puchivailo, 2019: 24).

Emerging from the philosophical tradition of phenomenology, phenomenological psychopathology is an interdisciplinary research program that aims to describe and classify changes in experiences in mental disorders (i.e., the characteristic features of the experience and manifestation of mental disorders). Phenomenological studies typically go beyond “objective” symptoms and descriptive characteristics to investigate the existential structures (and their changes) that give formal coherence and meaning to our experience of the world. These may include self-consciousness, embodiment, temporality, spatiality, affectivity and intersubjectivity, among others (Ritunnano et al., 2023).

Guilherme Messas, a representative of the Brazilian school of phenomenological psychopathology, emphasizes that the definition of this discipline is complex. He distinguishes two levels of understanding phenomenological psychopathology: a broader one, introduced by Karl Jaspers, which focuses on the description of subjective experiences, and a deeper one, which treats it as a fundamental science of psychiatry and psychology that studies the structures underlying subjectivity–intersubjectivity, embodiment, and spatiality (Puchivailo, 2019: 19). According to him, phenomenological psychopathology does not claim hegemony among all methods for studying human mental processes, but it is distinguished by its closeness to immediate experience, which makes it a valuable tool for integration with the biological sciences (Puchivailo, 2019: 19). Messas emphasizes that this dialogue is only just beginning and requires further development.

By extending these theoretical provisions into the realm of direct medical (clinical) research, phenomenological psychopathology in its practical application is aimed at studying the lifeworld of individuals whose mental functioning deviates from socially established norms of psychological functioning. The subject of its research is psychopathological phenomena and their subjective, lived dimensions. The methodological basis of this approach is the differentiation between objective, clinically observable symptoms and subjective manifestations, which are accessible only to the patient’s internal experience. This emphasis on the subjective sphere constitutes the fundamental difference between phenomenological psychopathology and prevailing biomedical therapeutic models. Karl Jaspers postulated that the subjective symptoms of patients belong to the sphere of their internal experience, the diagnostic assessment of which is characterized by significant difficulty (Maile, 2024: 305).

Phenomenological psychopathology has expanded from a simple description of patients’ subjective experiences to an analysis of the structures of subjectivity that shape the psychopathological lifeworld. It has become a theoretical basis for the development of therapeutic methods. Phenomenological psychopathology investigates the lifeworlds of mental disorders. The lifeworld is the immediate, evident, and indisputable foundation of everyday experience. Psychopathological symptoms reflect modifications of the basic dimensions of experience: time, space, corporality, selfhood, and intersubjectivity.

In the article “New Perspectives in Phenomenological Psychopathology: Its Use in Psychiatric Treatment”, Messas et al. provided a structured description of these basic dimensions of experience (Messas et al., 2018):

- Lived Time is the subjective perception of temporality, distinct from objective chronometric time, which gives a specific meaning to each experience.
- Lived Space is the way of pre-reflective living and experiencing spatiality as an embodied being within a situational context.

- Lived Body it is the body experienced from within, the body in the first-person perspective. The lived body is the center of three main dimensions of experience: self-experience and especially the most primitive form of self-awareness; object-experience and meaning-bestowing; the experience of other people.
- Intersubjectivity – the ability to directly understand the meaning of other people's behavior and expressions through pre-reflective encounters and pre-thematic contact.
- Selfhood – includes the pre-reflective Self (primitive self-awareness rooted in corporality) and the reflective Self (narrative identity formed through self-reflection).

Thus, the need for phenomenological psychopathology today is driven by modern psychiatry's need for methodological pluralism, which combines standardized diagnostic criteria with an in-depth description of the experience of mental illness from a first-person perspective (Spencer et al., 2024: 4). Although phenomenology has historically been of key importance for understanding mental disorders, it risks becoming separated from the interdisciplinary achievements of philosophy and the social sciences and losing its relevance. Its integration makes it possible to account for cultural and identity differences, give a voice to marginalized experiences, and expand the hermeneutic space for interpreting mental states. This project, aimed at the co-production of knowledge with the participation of people with lived experience of mental illness and clinicians, forms new interdisciplinary methodologies, updates the linguistic and conceptual foundations of the mental health sciences, and promotes the democratization of access to the knowledge gained (Spencer et al., 2024: 4). As a result, phenomenological psychopathology can play a leading role in clinical practice and research, providing diagnostic and therapeutic models that are more sensitive to cultural, social, and individual contexts.

The spectrum of research in modern phenomenological psychopathology not only encompasses theoretical explorations of the basic dimensions of experience but also demonstrates a completely practical orientation. Thus, applied research on anxiety, depression (including postpartum depression), post-traumatic stress disorder (PTSD), schizophrenia and other psychotic disorders, autism spectrum disorders, addictions, obsessive-compulsive disorder (OCD), premenstrual dysphoric disorder, and personality disorders has become particularly relevant. The validity and reliability of such studies are ensured by the methodology for conducting qualitative research using a phenomenological interview.

Phenomenological Interview.

Contemporary methods for obtaining psychopathological information rely almost exclusively on the use of structured questionnaires or checklists (Norgaard & Parnas, 2012: 128).

In psychiatric practice, the aforementioned research methods are used to gather preliminary data about a patient's mental state, thus forming an initial conceptual framework of the symptoms of a mental disorder. This data helps mental health specialists build a further strategy for conducting a psychiatric interview.

The psychiatric interview is the basic diagnostic tool in a psychiatrist's arsenal of diagnostic methods. The "gold standard" of a psychiatric interview is a highly structured method that allows for a clinical diagnosis (Maile, 2024: 319). Thus, structured interviews can help gather all the necessary information.

A psychiatric interview focuses on information from the patient about (Kung et al., 2023): identifying data, chief complaint, history of present illness, psychiatric review of systems, psychiatric history, substance use history, medical history, medical review of systems, family history, social history, and examination, including the mental status examination.

The Mental Status Examination consists of a systematic study of the following areas of a person's mental activity (Kung et al., 2023): appearance, behavior, attitude, speech, mood, affect, thought process, thought content, perception, cognition, insight (the patient understands that something is wrong with them, that they are ill, and that the illness is psychiatric), and motivation for treatment.

Such an approach to conducting a psychiatric interview is increasingly being criticized by the philosophy of psychiatry and phenomenological psychopathology.

Classically, a psychiatric interview begins with the clinician's question: "What is bothering you? Describe your complaints". This question, in the context of phenomenological psychopathology, takes on a unique quality. It initiates the beginning of an investigation into the inner and ineffable mental life of the psychiatric patient (Maile, 2024: 319). That is, the phenomenological component *a priori* appears as a necessary basis for conducting research in the field of psychiatry, despite the operational approach to psychiatry described above.

In the article "Open-mindedness and phenomenological psychopathology: an intellectual virtue account of phenomenology and three educational recommendations", the author reflects on what needs to be improved in the training system for future specialists in conducting psychiatric interviews so that the psychiatric interview truly reflects and records changes in a person's mental activity from a first-person perspective and serves as a process of creating shared knowledge about an individual's psychopathology in which both the clinician and the patient are involved as full-fledged epistemic agents (Maile, 2024). He singles out three important skills for a psychiatric interview that are necessary for mental health specialists to achieve the aforementioned goal: asking the right questions, responsible listening, and reflection.

Currently, the phenomenological component of a psychiatric interview is implicit. It is not a necessary component of conducting research on mental activity in routine psychiatric practice. However, this does not negate its importance in the diagnosis of mental and behavioral disorders, nor does it eliminate the need for further research. On the contrary, there is growing interest in the phenomenological interview and its potential in conducting qualitative research.

Qualitative research is a type of research that answers "how" and "why" questions and provides a deeper understanding of the phenomena being studied. One of the strengths of qualitative research is its ability to explain processes and patterns of human behavior. Phenomena such as experience, attitudes, and behavior can be difficult to accurately and quantitatively represent. The qualitative approach allows participants to explain themselves how, why, or what they thought, felt, and experienced at a certain time or during an event under study (Tenny et al., 2025).

Most often, the semi-structured interview method is used in qualitative research in phenomenological psychopathology. A semi-structured interview does not have a list of predefined questions. Instead, the interviewer usually has a list of core psychopathological topics that need to be explored to make a diagnosis or other clinical decisions (Henriksen et al., 2022: 21). However, the specific, practical course and sequence of the interview are determined by the dynamics and context of the meeting; that is, the style is free and conversational. Questions are adapted to the context and follow the logic of the patient's narrative (Norgaard & Parnas, 2012: 124). The patient is encouraged to speak freely, is rarely interrupted, and is

given time to reflect and recall situations in which the studied element of experience was lived. The interviewer guides the interview in the desired direction with questions and comments.

One of the main principles of the semi-structured phenomenological interview is to avoid simply accepting a “yes” or “no” answer from the patient. The patient is asked to provide detailed descriptions and explanations of their experiences, often using metaphors. In this context, a metaphor should be regarded as a basic functional aspect of the symbolization process (Parnas, Møller, et al., 2005: 237-238). It acts as a linguistic tool through which an experience is first formulated and becomes available for further reflection. The metaphor is the initial phase in which a pre-verbal or pre-reflective experience first becomes explicitly available to both the self and to another person (Parnas, Møller, et al., 2025: 237-238).

One of the first semi-structured phenomenological interviews is the Examination of Anomalous Self-Experience (EASE). EASE focuses on anomalies of subjective experience that appear to reflect disorders of self-awareness. The foundation for the development of EASE was based on self-descriptions obtained from patients suffering from schizophrenia spectrum disorders. Verification of the scale’s validity, reliability, and internal consistency proved that EASE has significant descriptive, diagnostic, and differential-diagnostic value for disorders in the schizophrenia spectrum. The structure of EASE is divided into five domains: cognition and stream of consciousness, self-awareness and presence, bodily experiences, demarcation/transitivity, and existential reorientation. These domains include types and subtypes for a comprehensive description of disorders of self-awareness.

Further developments in the application of semi-structured phenomenological interviews have resulted in the creation of the Examination of Anomalous World Experience (EAWE) and the Examination of Anomalous Fantasy and Imagination (EAFI).

The structure and features of the Examination of Anomalous World Experience (EAWE) will be described in more detail below.

The Examination of Anomalous Fantasy Imagination (EAFI) is a tool for the semi-structured phenomenological investigation of the psychopathology of imagination. The EAFI’s task is to study a specific dimension of subjective experience, disturbances in the structure of imagination, that are not reducible to the content characteristics of fantasies but, first and foremost, indicate a deep disorganization of consciousness (Rasmussen et al., 2018: 216-217). The interview creates a conceptual-descriptive framework for the detection of these phenomena, which allows the data obtained to be integrated into the broader context of clinical diagnosis and the phenomenological analysis of psychopathology.

EAFI consists of 16 main points: spatiotemporal constancy, autonomy, localization and sense of experiential distance, intense affects, imagination as multimodal perceptualization, anomalous vivid imaginary experience, unspecified, violent, macabre or bizarre content, ruminations-obsessions, disturbance of control, loss of ipseity, image interference, image pressure, existential reorientation in fantasy, preoccupation with fantasy life, disturbances of irreality, lack of insight (Rasmussen et al., 2018: 225).

The general prerequisites for conducting the aforementioned semi-structured phenomenological interviews include the interviewer’s sufficient competence not only in the field of psychiatric psychopathology but also a thorough knowledge of phenomenology and phenomenological psychopathology. This, in fact, constitutes one of the main limitations in using these methods on a regular basis in the process of diagnosing mental and behavioral disorders, as it requires additional training for mental health specialists in the aforementioned “philosophical disciplines”. Another limitation is the duration of such an interview. On average, a semi-structured phenomenological interview takes 60–90 minutes, and in some cases up to

120 minutes. In the context of the mental health care system, this is a significant amount of time used for the diagnosis of a single patient; for example, an outpatient psychiatric appointment is scheduled for 20 to 40 minutes. Therefore, the phenomenological interview is currently most often conducted either for scientific research or with patients who are undergoing inpatient treatment, which makes it possible to allocate such a time frame for the study. Additionally, to ensure the validity and reliability of the methodologies, audio/video recording of the interview (with the patient's consent) should be carried out for subsequent review by another specialist.

Nevertheless, modern phenomenological psychopathology is constantly being supplemented with new tools for studying anomalous experiences. An example of this is the creation of The Inventory of Psychotic-Like Anomalous Self-Experiences (IPASE) (Cicero et al., 2017: 13). This instrument is a set of questions for self-report for the early detection of anomalous self-experiences in schizophrenia. Further studies have confirmed the construct validity of the IPASE, demonstrating both convergent and discriminant validity. Therefore, the IPASE may be suitable as a screening tool for detecting minimal self-disorders, but it does not replace detailed investigations, such as the EASE (Nelson et al., 2019: 686).

Tools are also being created that do not necessarily require the interviewer to have a background in phenomenology and phenomenological psychology. An example is the Transdiagnostic Assessment of Temporal Experience (TATE) – a structured interview whose goal is to investigate anomalous experiences of time in individuals with various forms of abnormal mental states, regardless of their diagnosis, in order to outline clearly defined anomalous time experience profiles for each psychopathological lifeworld (Stanghellini et al., 2022: 95). This allows for the capture of subtle nuances of anomalous time experiences and can help in understanding how a person lives directly in their lifeworld. This tool provides a more accurate assessment of relevant psychopathological symptoms (e.g., differentiating various types of delusions based on their temporal profile) and a deeper understanding of a patient's anomalous behavior (e.g., impulsivity or social isolation) in connection with specific types of time experience (Stanghellini et al., 2022: 73).

Therefore, qualitative research in phenomenological psychopathology is intended to study how people make sense of anomalous experiences, as well as the reasoning and resources that shape the descriptions of such experiences. The use of a phenomenological interview approach provides deep knowledge and understanding of patients' lived experiences. The data obtained should be included to improve the provision of mental health care and the healthcare system in general.

1. EAWEx as a method for Anomalous World Experience description

The Examination of Anomalous World Experience (EAWEx) is a semi-structured interview designed to study subjective anomalies in a person's experience of the external world, language, and other people – that is, their “lived world” (Sass et al., 2017: 10).

The EAWEx was developed by a team of authors led by Louis Sass and was first published in the journal *Psychopathology* in 2017.

The semi-structured interview is based on clinical data and anomalous world experiences obtained from people suffering from schizophrenia spectrum disorders and other psychotic mental disorders. Some of these features can also be found in other mental disorders, such as bipolar disorder, major depression, borderline personality disorder, as well as in various dissociative states, such as panic disorder, depersonalization disorder, or post-traumatic stress disorder (Sass 2017: 8).

The authors point to the significant descriptive, differential, diagnostic, and possibly prognostic value of the EAWE for the aforementioned mental disorders, as well as for other mental and behavioral disorders that are accompanied by disorders of the lived world (Sass et al., 2017: 11).

The impetus for creating the EAWE was the need to systematize and create a unified and single list of phenomena of individual mental activity that arise as a result of disorders of the lived world.

The EAWE focuses not on the more florid and overt symptoms crucial for standard diagnoses (such as hallucinations, delusions, and “negative” symptoms) but on assessing an underlying orientation or vulnerability manifest in subtle alterations in the person’s experience of or subjective perspective on the lived world (Sass et al., 2017: 11).

World experience in the context of the EAWE is described using six domains:

1. Space and Objects: this domain, consisting of 17 points, is focused on experiences related to spatial organization, the perception of objects in the world, and the qualities of sensory information (Sass et al., 2017: 16). It covers disturbances where space may be perceived as dangerous or unstable, and objects as artificial or unreal.
2. Time and Events: this domain, consisting of 6 points, is dedicated to the study of the perception of time and the sequence of events. The main focus here is on the temporal and dynamic aspects of the world related to movement, memory, anticipation, and changes over time (Sass et al., 2017: 22). Anomalies may manifest as a feeling that time is broken, accelerated, slowed down, or frozen, and that events are disconnected from one another.
3. Other Persons: this domain, consisting of 14 points, concerns the fundamental experience of perceiving other people, the experience of social interaction, empathy or its absence, and interpersonal boundaries (Sass et al., 2017: 26). Disturbances may involve the feeling that others are “puppets”, “shadows”, or “robots”, devoid of inner life.
4. Language: this domain, consisting of 10 points, is focused on anomalous ways of perceiving language, both one’s own and that of others. The main focus here is on the subjective perception of words and meanings, the flow of speech, grammar, verbal concepts, and problems of verbal expression (Sass et al., 2017: 32). Anomalous phenomena described here include the loss of the self-evidence of language, where it is perceived only as sounds, or the feeling that words are alien.
5. Atmosphere: this domain, consisting of 17 points, describes the general, pre-reflective feeling of the world’s reality and familiarity (Sass et al., 2017: 32). The disturbances described in this domain can lead to a feeling that the world is “empty”, “colorless”, or has lost its usual structure and meaning.
6. Existential Orientation: this domain, consisting of 11 points, investigates experiences related to values, worldview, and the sense of existence (Sass et al., 2017: 44). This domain covers fundamental changes in the sense of the world, its meaning, and reality, as well as the emergence of new, overvalued life orientations and the subordination of one’s life to religious, philosophical, or esoteric doctrines.

Some items within certain EAWE domains overlap with those present in the EASE. EAWE functions as a complement to EASE because self-experience and world-experience are intrinsically linked and occasionally intersect (Sass et al., 2017: 11). This overlap makes it feasible to conduct comprehensive investigations using both instruments. In such cases, it is

advisable to administer them on separate occasions: EASE on one day and EAWC on another – to mitigate respondent fatigue inherent in prolonged interviews, which can compromise data validity.

Accordingly, the study of anomalous world experience in schizophrenia using the EAWC may contribute to a more reliable and substantiated conceptualization of this disorder from a phenomenological psychopathology perspective. Experts note that schizophrenia-spectrum disorders appear to involve fundamental alterations in the very environment of experience (Sass et al., 2017: 8). Future research in this area is essential to generate precise and meaningful descriptions of this elusive yet significant spectrum of disorders, to explore potential correlations with other mental illnesses, and to test the hypothesis that disturbances in self-perception and world-perception arise from a common pathological substrate and unfold in parallel (Silverstein et al., 2017: 66).

2. EAWC implementation in modern Ukrainian cultural peculiarities (in the conditions of war)

Psychopathology cannot be explained solely on the basis of brain dysfunction. The environment in which psychopathology develops has a significant influence, with cultural influences playing a particularly important role (Gureje et al., 2020).

Cultural aspects are important for the classification and diagnosis of mental disorders because they improve diagnostic assessments and reduce the possibility of iatrogenesis resulting from the misdiagnosis of mental disorders that are not culturally oriented. However, the international system for classifying mental disorders must strike a pragmatic balance between the need for a universal classification system that can facilitate the reliable transmission of clinical information across geographical and cultural boundaries while retaining the ability to be contextually and culturally relevant during clinical interaction, as this interaction is converted into medical information and healthcare actions (Introductory Textbook of Psychiatry, 2025).

Social science research has shown that culture significantly influences the development of mental illnesses. At the same time, clinical methods that take the cultural aspects of illness into account have not yet been fully integrated into standard medical practice. One of the main obstacles is the belief that specialized competencies are required to work with cultural dimensions.

Nevertheless, the diagnosis of mental and behavioral disorders, with an emphasis on the peculiarities of the development and explication of symptoms, is constantly being improved.

During the development of DSM-5, key cultural dimensions were explicitly integrated into its diagnostic framework to ensure that cultural contexts inform both symptom expression and the individual's lived experience, which serve as essential diagnostic criteria (American Psychiatric Association, 2013). Consequently, diagnostic assessment must evaluate whether a person's experiences, symptoms, and behaviors deviate from prevailing sociocultural norms and result in functional impairment.

By contrast, ICD-10 prioritized the identification of transcultural commonalities over capturing the full range of culturally variant clinical presentations, necessitating numerous national and regional adaptations. In ICD-11, however, the role of culture in psychiatric diagnosis has been substantially enhanced. The revision of Chapter 6 "Mental, Behavioural or Neurodevelopmental Disorders" aims to strengthen the scientific validity of diagnostic categories, promote global applicability, incorporate cultural contextualization for each

disorder, improve clinical utility, and achieve greater harmonization with DSM-5 (Seemüller, 2023).

In Ukraine, the transition to ICD-11 for disease coding and classification will take effect on 1 January 2027 (“On approval of the Operational Plan for Ukraine’s transition to the International Statistical Classification of Diseases and Related Health Problems, eleventh revision, for 2025-2026”, 2025). This shift will also influence diagnostic practices for mental disorders, a category whose prevalence has surged since the onset of the full-scale invasion. Notably, stress-related disorders, such as post-traumatic stress disorder, now constitute a substantial proportion of psychiatric diagnoses (Lazarieva, 2025).

The aim of phenomenological psychopathology and the semi-structured EAWE interview in the Ukrainian context is to refine the diagnosis of PTSD and schizophrenia-spectrum disorders. As noted above, these nosological categories may share core psychopathological phenomena related to the lived world, making diagnostic precision essential, particularly because PTSD can present with psychotic features. In ICD-11, specific guidance addresses the cultural context of PTSD and the potential co-occurrence of post-traumatic and psychotic symptoms (World Health Organization, 2025).

A compelling illustration of EAWE’s practical utility in a complex diagnostic scenario is provided by Neto et al. (2021). They describe a patient with psychotic features initially diagnosed with schizophrenia based solely on symptom correspondence with classification criteria, because “PTSD with psychotic features” was not recognized in Brazilian psychiatric practice. This misdiagnosis had serious consequences: the prescribed antipsychotic regimen proved ineffective, and its side effects severely impaired the patient’s quality of life (Neto et al., 2021: 46).

Through EAWE, the patient’s subjective experience was explored across fundamental experiential structures: spatiality, temporality, embodiment, and intersubjectivity. He reported a pervasive, all-encompassing fear that obliterated his intentional engagement with the world, a feature more characteristic of PTSD than of schizophrenia. Furthermore, the absence of formal thought disorder argued against a schizophrenia diagnosis (Neto et al., 2021: 55). This case underscores how EAWE can enhance diagnostic accuracy by capturing the lived-world alterations that distinguish PTSD with psychotic features from primary psychotic disorders.

The presence of psychotic symptoms in PTSD does not necessarily indicate an endogenous psychiatric disorder (e.g., schizophrenia). Such differentiation is critical, since individuals carrying psychotic-spectrum diagnoses often face social stigma, which may give rise to additional complications (Gorshkov et al., 2024). This underscores the necessity of a comprehensive approach to the assessment of both core and accompanying PTSD symptoms, evaluating their severity and clinical significance from the perspectives of both conventional psychiatry and phenomenological psychopathology, utilizing the semi-structured EAWE interview. Doing so is likely to reduce the rate of diagnostic errors and, consequently, improve treatment outcomes.

One of the primary challenges in implementing EAWE within contemporary Ukrainian diagnostic practice involves the rigorous cultural and linguistic adaptation of the interview. Despite translation and initial piloting, certain technical terms and phenomenological descriptions remain insufficiently clear for some respondents, particularly those lacking higher education or accustomed to verbally articulating reflections on their lived experience. Moreover, the Ukrainian cultural context, especially under conditions of martial law, generates specific semantic frameworks in which anomalous world-experience may acquire new, contextually adaptive meanings. Phenomena that in peacetime might be pathologized (e.g.,

persistent threat apprehension or experiences of the world's "unreality") may in wartime serve adaptive or situational functions. This reality demands exceptional sensitivity in interpreting respondents' accounts to avoid mislabelling traumatic experiences as pathological.

Moreover, the EAWE's structure presupposes a level of narrative and phenomenological depth that can conflict with the linguistic practices of individuals whose experiences are shaped by collective trauma, time constraints, or cognitive exhaustion. Military personnel, internally displaced persons, or individuals who have suffered loss often convey their condition through fragmented imagery, emotionally charged metaphors, or body-centered sensations. This necessitates flexibility on the part of the interviewer and the adaptation of formal interview items to culturally relevant modes of expression.

It is also essential to recognize that interpreting EAWE phenomena without reference to a respondent's biographical, social, and somatic context can lead to oversimplification or misinterpretation. Anomalous world-experience, as captured in interview responses, is frequently rooted in specific life circumstances, such as the loss of one's home, participation in combat, prolonged sheltering, or separation from family. Therefore, each interview must be accompanied by biographical contextualization to preserve both phenomenological accuracy and ethical sensitivity.

These considerations underscore the need for further methodological development of the EAWE, including the creation of a Ukrainian-language glossary of phenomenological terms for clinicians and mental health researchers; the design of culturally and contextually adapted interview protocols; the integration of narrative storytelling strategies; and the systematic incorporation of multi-layered cultural, social, and historical influences on the structure of subjective experience.

3. Traumas in the structure of Anomalous World Experience

Anomalous experiences are persistently linked to traumatic history, the explication of which is inextricably shaped by cultural and anthropological elements (Rabeyron & Loose, 2015). Within phenomenological psychopathology, trauma is understood not merely as a psychic injury resulting from an extreme event but as a transformative occurrence that radically alters one's mode of being in the world. This perspective transcends reductionist models of psychotrauma that interpret trauma exclusively through physiological stress responses or behavioral sequelae of overwhelming stimuli. Instead, the phenomenological approach emphasizes changes in the foundational coordinates of a person's lifeworld (temporality, spatiality, and intersubjectivity) as well as disruptions in the intentional structure of consciousness, which undermine the cohesive experience of the world as connected, familiar, and stable.

From a phenomenological standpoint, trauma is not solely an event located in the chronological past but an active structural factor of subjective reality. It becomes incorporated into ongoing experience, modifying the basic frameworks of perception, memory, and expectation. In the context of anomalous world experience, traumatic events transform the familiar lifeworld into an alienated, fragmented, and at times hostile space.

EAWE provides the necessary categorical framework for identifying trauma-related alterations in the lived world. We posit that traumatic experiences induce a pervasive transformation of the world, manifesting as a total displacement: familiar places become unpredictable, sounds lose their customary meaning, and the flow of time feels "shattered" or "frozen". These alterations constitute the core of anomalous world-experience, in which trauma functions not merely as the content of memory but as a mechanism deforming the very structure of experience.

A principal phenomenon of traumatic experience is the disruption of temporality. The structured continuity of time, which ordinarily ensures coherence among past, present, and future, is compromised (Brencio & Novak, 2019: 11). This temporal disorientation, experienced as a “time vacuum” or “splitting”, is a defining feature of anomalous world-experience following trauma. Individuals who have been traumatized often lose the capacity to project themselves into the future; their intentional horizon becomes blocked or narrowed to a single recurring theme, typically the re-experiencing of threat or loss.

EAWWE also enables the detection of profound alterations in the experience of space following trauma. Patients may report that “the world has become alien”, that “the surrounding space feels either too empty or too crowded”, that “objects lose their contours”, or that they “rush toward me too quickly”. Such descriptions indicate a loss of the natural, embodied orientation in space, which ordinarily relies on trust in one’s body as an intermediary between the self and the world.

Disturbed embodiment, manifesting as a disrupted sense of bodily boundaries, altered weight of the body, or weakened connection with one’s environment, constitutes another component of the anomalous world after trauma (Stupiggia, 2019). Space ceases to function as a familiar context for interaction and becomes instead a source of threat or unpredictability.

Trauma is further accompanied by radical disturbances in intersubjectivity: the individual loses the capacity for prereflective understanding of others and for experiencing oneself as significant within the shared social world.

From a phenomenological standpoint, trauma reveals its ontological dimension: it transforms not only the subject’s mental state but also the very structure of the world in which the subject lives. Within EAWWE, these transformations can be systematically described across the domains of temporality, spatiality, embodiment, and intersubjectivity. This approach transcends diagnostic classifications and restores engagement with the unique, often marginalized, lived experience in clinical practice.

In the context of contemporary Ukrainian culture, marked by war, displacement, loss, and existential anxiety, the phenomenological analysis of traumatic experience becomes not only a means of understanding psychopathology but also a form of cultural therapy, reestablishing the disrupted meaningful connection with the world.

4. Case-report

In the following subsection, we present an unpublished clinical case from a psychiatric ward to illustrate the application of the EAWWE within the specific context of contemporary Ukrainian culture. The patient’s symptomatology is atypical for standard diagnostic systems and therefore does not correspond fully to any of the diagnoses listed below.

Patient K. is a 38-year-old unmarried male service member who was mobilized into the armed forces three years ago as a combat medic, a role partly aligned with his civilian training as a paramedic. Prior to his mobilization, he had worked as a nurse in a psychiatric unit. He is seeking medical assistance for the third time; his previous hospitalization occurred six months ago and lasted forty days.

Patient K. reports the onset of his illness in autumn 2022, following a night combat operation. While positioned in a trench, he distinctly heard a voice emanating from the depths of the forest, calling for help, groaning, and crying (auditory hallucinations). He verified the presence of any living being in that area using a thermal imager but observed none. He initially attributed this anomalous experience to physical exhaustion.

Over subsequent nocturnal watches, these auditory phenomena recurred intermittently. Approximately three weeks later, visual hallucinations emerged: he perceived human-like silhouettes running into the forest and beckoning him to follow. These episodes were accompanied by profound temporal disturbances, time appeared to “freeze”, slow down, and stretch. He also experienced tactile hallucinations, feeling as though these figures grasped his hands, twisted them, and dragged him along. Although he initially attempted to repel these visions, he recognized their non-reality, an insight he attributes to his decade of experience as a psychiatric ward nurse and his daily exposure to patients with diverse anomalous experiences.

Several days after the onset of these multimodal hallucinations, paranoid ideation developed: he felt persistently watched, as though someone stood behind him, “drilling” into the back of his head with their gaze and harbored the conviction that an unidentified individual intended him harm. Consequently, he became markedly suspicious and distrustful of those around him.

Throughout this period, he did not seek specialized medical care.

In early summer 2023, the patient sought his first voluntary hospitalization, driven by intrusive thoughts that, in his anomalous state, he might harm others. Following a regimen of psychopharmacological and psychotherapeutic interventions, he reported subjective relief: the auditory and visual hallucinations resolved completely, although residual fragmented experiences of paranoid anxiety persisted.

At the time of his current admission to the psychiatric inpatient unit, the patient complains of an inability to sustain nocturnal sleep without psychotropic medication; he reports heightened irritability, unprovoked aggression, pervasive inner emptiness, depressed mood with an inability to experience positive affect, and persistent anxiety of a paranoid nature. He describes an exaggerated hypervigilance toward others. Additionally, he experiences partial loss of colour perception: at times, his environment appears entirely black and white, and at others as muted or insufficiently vivid. He also intermittently feels as though he is observing himself from an external vantage point, sometimes accompanied by a genuine visual impression of seeing his own body from the outside.

The patient frequently experiences nightmarish dreams concerning past psychotraumatic events, most often involving the deaths of comrades during assault operations on enemy fortifications. Sounds resembling explosions trigger the re-experiencing of these traumatic events. There is a notable decline in his ability to recall and reconstruct a coherent narrative of the original trauma. The patient also reports significant impairments in his social functioning: he finds it difficult to communicate and maintain conversations with others, particularly with civilians who lack combat experience. Recently, he has developed an interest in Slavic mythology and has begun to incorporate various associated ritual practices and prayers into his daily life.

Subsequently, an analysis of the patient’s reported symptoms (i.e., the phenomena of his mental activity) was conducted. The analysis presented here aims to structure the patient’s anomalous subjective experience, of a 38-year-old service member, according to the phenomenological framework of the EAW interview. This approach enables a detailed description of the alterations in world-experience that are central to his clinical presentation.

In the examination of Domain 1 “Space and Objects”, which encompasses anomalies in spatial and object perception, phenomena across multiple sensory modalities were identified. Under item 1.1 “Abnormal Intensity or Persistence of Visual Perceptions”, specifically subitem 1.1.2 “Decrease in Intensity of Visual Perceptions”, the patient reports a “partial loss of colour

in the surrounding world”. At times the environment appears “completely black and white”, while on other occasions its coloration seems “faded, insufficiently vivid”.

Distortions in perceptual veridicality emerged in several areas. Under item 1.3 “Disturbances Involving Veridicality (Accuracy) of Visual Perceptions”, corresponding to subitem 1.3.2 “Visual Hallucinations”, the patient describes visual images “in the form of human-shaped figures» that “run into the forest and call him to follow”. Similarly, under item 1.10 “Disturbances Involving Veridicality (Accuracy) of Auditory Perceptions”, aligning with subitem 1.10.2 “Auditory Hallucinations”, he heard “a voice from deep in the woods calling for help, groaning, crying”. Notably, the patient maintained critical insight into these experiences, recognizing their unreality.

Additional anomalies in other sensory modalities were documented under item 1.13 “Disturbances of Other Senses”. In particular, subitem 1.13.1 “Tactile Disturbance”, captures his haptic hallucinations, during which he felt as though these hallucinatory figures “grasped his hands, twisted them, and pulled him along”.

Furthermore, autoscopic phenomena “the sensation of observing oneself from the outside” were reported, occasionally accompanied by a visual impression of seeing his own body externally. Although such experiences pertain primarily to self-perception anomalies and are more characteristic of the EASE scale, their presence is critical for a comprehensive clinical profile.

The analysis of the patient’s temporal experience within Domain 2 “Time and Events”, revealed several salient phenomena. Under item 2.1 “Time or Movements Appear to Change Speed”, the patient’s experiences correspond to subitem 2.1.2 “Time or Movements Seem Slowed Down”, as he reports episodes of “time standing still”, marked deceleration, and temporal stretching. In item 2.4 “Disturbed Anticipation”, he exhibits “paranoid-type anxious anticipation, matching subitem 2.4.1 “Perpetual Anticipation”. Significant alterations also emerge in item 2.6 “Disturbed Experience of Memories or of the Past”. His difficulty in “recalling a coherent, detailed account of the traumatic event» aligns with subitems 2.6.2 “Past Seems Vague or Obscure” and 2.6.8 “Past Seems Disjointed”. The intrusiveness of past events, subitem 2.6.6 “Intrusiveness of the Past”, is manifested in recurrent nightmares about psychotraumatic episodes, while the re-experiencing of trauma triggered by explosion-like sounds reflects subitem 2.6.7 “Erosion of Distinction Between Past and Present”.

In Domain 3 “Other Persons”, which addresses the interpersonal world, the patient’s experience is characterized by alienation and mistrust. His report of “significant impairments in social functioning” corresponds to item 3.1 “Lack of Social Understanding or Interpersonal Attunement (Hypoattunement)”. He finds communication with civilians, those without combat experience, particularly difficult, indicating “Active Withdrawal” (subitem 3.14.1). Under item 3.4 “Sense of Inferiority, Criticism, or Mistrust in Relation to Others”, the patient displays paranoid experiences such as the sensation of “constantly being watched” and a gaze “drilling into the back of his head”, matching subitem 3.4.2 “Feelings of Social Paranoia or Social Anxiety”. His pervasive suspicion and distrust toward others correspond to subitem 3.4.3 “Pervasive Mistrust of Others”.

In Domain 4 “Language”, no relevant phenomena were elicited from the available clinical data.

In Domain 5 “Atmosphere”, Patient K. exhibits several notable phenomena. His pervasive sensation of being constantly watched corresponds to item 5.12 “All-inclusive Self-consciousness/Ontological Paranoia”. The experience that “someone intends to harm him” reflects paranoid salience under subitem 5.14.2.a “Paranoid Significance”, within item

5.14 “Revelatory or Pseudorevelatory (Apophanous) Mood”. Significant disruptions are also present in item 5.17 “Anomalies of Mood or Affect”. His complaints of “inner emptiness” and “inability to feel positive emotions” align with subitem 5.17.1 “Emptiness, Numbness, Indifference, Lack of Spontaneous Response to the World”. The “fragmented sense of paranoid anxiety” corresponds to subitem 5.17.3 “Pervasive, Nameless Anxiety with Fear of Annihilation”, while “increased irritability and unmotivated aggression” map onto subitem 5.17.4 “Basic Irritation, Restlessness, Anger (Nonemotional Dysphoria)”.

Finally, in Domain 6, “Existential Orientation”, which captures fundamental shifts in worldview and values, several features emerge. The patient’s preoccupation with whether he might “harm others” indicates hyperresponsibility and guilt projecting into the future, corresponding in part to item 6.6, “Impossible Responsibility or Guilt”. Most prominently, item 6.9 “Existential or Intellectual Change”, is illustrated by his report of having “incorporated various ritual practices and prayers” into his life a direct manifestation of newly adopted religious or metaphysical concerns. This shift reflects an active attempt to make sense of his anomalous experiences and to establish a renewed framework of personal values.

The analysis of Patient K.’s experience through the EAW domains reveals a profound, systemic disturbance of the basic structures of experience, characteristic of schizophrenia-spectrum disorders. Phenomenological psychopathology conceptualizes schizophrenia as a “loss of natural self-evidence”, that is, the loss of a pre-reflective trust in reality (Guardascione, 2023). In this patient, such disturbance is not confined to isolated hallucinations but manifests as an alteration of the very “atmosphere” of the world (Domain 5). The world loses its stability and safety, acquiring threatening qualities that crystallize in the sensation of being constantly observed (5.12 All-inclusive Self-consciousness/ontological “paranoia”) and in paranoid significance (5.14.2.a Paranoid Significance). The sensory fabric of reality itself disintegrates: the world becomes dull and loses its colors (1.1.2 Decrease in Intensity of Visual Perceptions), indicating a weakening of what phenomenology terms the subject’s “grip” or “hold” on the world (Sass et al., 2017: 11).

Healthy world-perception is inextricably tied to a shared, communal space with others. In this patient, there is a loss of intuitive social understanding (3.1 Lack of Social Understanding or Interpersonal Attunement), especially toward those without his combat experience (civilians). The social world ceases to be a sphere of interaction and becomes a source of threat (3.4.2 Feelings of Social Paranoia and 3.4.3 Pervasive Mistrust). This is not merely social anxiety but a fundamental rupture with the world of others.

Time provides the foundation for a coherent, continuous experience. In the patient’s case, there is not merely a subjective impression but a structural breakdown of temporal flow: time “freezes” and “stretches” (2.1.2 Time or Movements Seem Slowed Down). The past becomes intrusive and fragmented (2.6.6 Intrusiveness of the Past; 2.6.8 Past Seems Disjointed). Such disruptions are central to schizophrenia, as they undermine the very basis for constructing a coherent sense of self.

Thus, the phenomenological analysis demonstrates that the patient’s symptoms do not constitute a collection of isolated signs but rather the manifestation of a single process: the destruction of the fundamental structures of the lived world.

The structural disturbances identified in this case manifest through symptoms that fully meet schizophrenia criteria, as evidenced by the presence of both positive (persistent hallucinations and delusions) and negative (anhedonia) symptomatology. The duration of illness far exceeds the minimum thresholds of six months for DSM-5 and one month for ICD-11, and there is pronounced social dysfunction.

Differential diagnosis. A key consideration is the relationship of the patient's condition to combat trauma. PTSD must be considered, since symptom onset coincides with a traumatic event and the patient exhibits classic PTSD features such as nightmares and flashbacks. While PTSD can include psychotic symptoms thematically linked to the trauma re-experiencing phenomena as described in ICD-11 the anomalies in Patient K. are more global and structural: fundamental alterations of time perception, global colour desaturation, and pervasive interpersonal disturbances. These changes reflect not merely intrusion of the past into the present, as in PTSD, but a wholesale reconfiguration of the lifeworld's structure characteristic of a primary psychotic disorder. It is likely that combat trauma served as a powerful trigger for the manifestation of a schizophrenic process and shaped the content of his experiences (e.g., the narrative of his nightmares).

The application of the semi-structured EAWWE interview in this case revealed a systemic disintegration of the patient's lived world underlying the formal symptom set, supporting a diagnosis of schizophrenia. The atypical features noted, namely, the patient's high degree of insight and the potent influence of trauma, complicate the diagnostic process but do not negate the presence of schizophrenia-level disruptions in experiential structure.

Conclusions

The conducted research aimed to implement and evaluate the semi-structured phenomenological interview, the Examination of Anomalous World Experience (EAWWE), in the context of contemporary Ukrainian culture, particularly during wartime. The main hypothesis was that the EAWWE could offer higher diagnostic accuracy and reliability in differentiating between schizophrenia spectrum disorders (SSD) and post-traumatic stress disorder (PTSD) with psychotic symptoms, compared to traditional clinical methods.

As the theoretical analysis showed, the approaches dominant in modern psychiatry (biological objectivism and operationalism), while providing diagnostic standardization, have simultaneously led to significant epistemological gaps. By focusing on formalized, observable symptoms, these approaches often neglect the patient's unique subjective experience, their lifeworld, and their sociocultural context. This creates risks of diagnostic errors, especially in complex cases where symptoms are atypical or lie at the intersection of several nosologies, such as SSD and PTSD.

Phenomenological psychopathology offers a way to overcome these limitations by advocating for an analysis of the fundamental structures of experience: space, time, corporality, intersubjectivity, and selfhood. Tools based on this approach, particularly the EAWWE, make it possible to move beyond simply documenting "what" the patient is experiencing and investigate "how" their world is transformed.

The analysis of patient K.'s clinical case clearly demonstrated the advantages of this approach. Formally, his symptoms (hallucinations, paranoid ideas, social dysfunction) could fit either SSD or PTSD with psychotic features, especially given the presence of combat-related traumatic experience. However, the application of the EAWWE's categorical framework allowed for the detection of a systemic disintegration of the experienced world, which is more characteristic of schizophrenia spectrum disorders than of post-traumatic stress disorder.

These findings suggest that the combat-related traumatic experience likely acted as a powerful trigger that initiated the manifestation of the schizophrenic process, rather than being its primary cause. Thus, the EAWWE made it possible to substantiate a diagnosis of schizophrenia at a deeper, structural level, which confirms our initial hypothesis.

At the same time, the implementation of the EAWE in the Ukrainian context revealed a number of challenges. Firstly, there is a need for careful cultural and linguistic adaptation of the semi-structured phenomenological interview, as some phenomenological concepts may be difficult for respondents without experience in verbal reflection. Secondly, in a wartime context, experiences of a “non-real” world or a constant threat can be situationally adaptive, which requires extreme sensitivity from the clinician so as not to pathologize a normal reaction to abnormal circumstances. Each case requires deep biographical and cultural contextualization.

Based on the conducted research, the following conclusions can be drawn:

1. The semi-structured phenomenological interview EAWE is a valid and reliable tool for a deep investigation of the anomalous experience of the world. It complements standard diagnostic methods by providing access to the subjective dimensions of a mental disorder that are often overlooked by operationalist approaches.
2. The application of the EAWE demonstrated high differential-diagnostic value in distinguishing between schizophrenia spectrum disorders and PTSD. The analysis of the basic structures of experience (time, space, intersubjectivity) allows for the detection of a fundamental restructuring of worldview characteristic of schizophrenia, in contrast to the more focused on the past disturbance in PTSD.
3. The implementation of the EAWE in Ukrainian clinical practice is relevant and promising but requires a systemic approach. It is necessary to develop a Ukrainian-language glossary of phenomenological concepts, conduct training for mental health professionals, and adapt the methodology to account for the unique sociocultural and historical context, particularly the traumatic experience of war.
4. Phenomenological psychopathology plays a key role in the humanization of psychiatry. It returns the unique lifeworld of the patient to the center of attention, contributing not only to a more accurate diagnosis but also to deeper therapeutic contact and the co-creation of knowledge about the experience of mental illness.

Therefore, the integration of the semi-structured phenomenological interview method, the EAWE, into clinical practice and scientific research in Ukraine can significantly improve the quality of diagnostics and mental health care, making it more accurate, holistic, and sensitive to each person’s unique experience of mental illness.

Authors’ contributions: Sergii Rudenko: research supervision, manuscript review; data validation;

Mykhailo Tasenko: research, data collection, processing and synthesis, sources, methodology, writing the main text of the manuscript, formulation of conclusions.

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Part 3: COSMOS AND HISTORY

From Reductionism to Contextualism: L. Wittgenstein and the Dimensions of Modern Cosmology

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This article offers a consideration of potential ways to apply the methodology of the philosophy of everyday language to solve modern problems of cosmology and the philosophy of cosmology. Modern cosmology emerges as an independent scientific discipline, the goal of which is a comprehensive understanding of the Universe in its entirety – in the context of space, time, as well as from the point of view of its physical properties and evolutionary dynamics. Cosmology requires a systematic analysis and construction of knowledge about the cosmos, which cannot be simplified to simple empirical data due to their complexity. Modern cosmology must be focused on advanced experimental approaches, should have solid theoretical basis, and corresponded to deep philosophical analysis.

The critique of fragment 608 of Wittgenstein's Zettel, which is part of the critique of cognitive reductionism, reveals an alternative philosophical perspective on language and thought. Wittgenstein views language as a social phenomenon implicit in social practices and forms of life and thinking as a human activity in the world. This change in methodological position from reductionism to contextualism makes it possible to consider cosmology not only as an objective description of reality, but also as a collective interpretation of human existence in the cosmos. Thus, Wittgenstein's views make it possible to consider cosmology as knowledge at the intersection of science, philosophy, and culture, allowing to solve pressing methodological issues through linguistic analysis.

Keywords: modern cosmology, philosophy of cosmology, ordinary language philosophy, linguistic analysis, Wittgenstein

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Introduction

Cosmological research is closely related to philosophical explorations, as it addresses important questions about the origin, existence, and evolution of both the universe and human life in it. In this context, cosmology performs not only a scientific function, but also a worldview role, helping people understand their place in the cosmic order and clarifying the connection between physical reality and its interpretive meanings.

Cosmology examines the Universe as an integrated system across multiple dimensions – spatial, temporal, physical, and evolutionary. The aim of this scientific discipline is not only in describing the observed structure of the cosmos but also to reconstruct its history, explain the formation mechanisms of large-scale structures, and develop scientifically grounded forecasts regarding the Universe’s future development.

Given the Universe’s complex, multi-level hierarchical organization, cosmologists rely on abstract models to effectively characterize it. As noted in the 2017 second edition of *Introduction to Cosmology*, edited by Barbara Ryden and published by Cambridge University Press, “The universe, after all, is richly textured, with structures on a vast range of scales; planets orbit stars, stars are collected into galaxies, galaxies are gravitationally bound into clusters, and even clusters of galaxies are found within larger superclusters” (Ryden, 2017: 13). Such idealized models enable researchers to focus on large-scale patterns while maintaining analytical rigor. So, we can make some parallels with the ordinary language philosophy, shaped by two influential trends within twentieth-century Anglo-American analytical philosophy: the philosophy of ideal language and linguistic analysis.

Modern cosmological inquiries unite both scientific and philosophical approaches. Such inquiries arise fundamental questions about the origin, structure, and future trajectory of the Universe. In the early stage of cosmological research, it typically focuses on idealized models of the Universe, abstracted from local inhomogeneities. Only in subsequent stages do scientists examine the emergence of localized structures – such as galaxies, clusters, and superclusters – as outcomes of gravitational instabilities occurring during cosmic evolution. Notably, the concept of “smoothing” serves not only as an analytical tool but also holds methodological importance by allowing focus on large-scale laws without distraction from small-scale “structural irregularities,” which remain subjects of specialized investigation.

Barbara Ryden emphasizes: “These questions are both scientific and philosophical. Their formulation, to a certain extent, is symbolized in the caption of the famous painting by Paul Gauguin: ‘Where did we come from? Who are we? Where are we going?’ It is within this paradigm that cosmology seeks to understand the Universe’s origin, evolutionary mechanisms, and possible future scenarios” (Ryden, 2017: 13). In 2021, Scott Dodelson published *Modern Cosmology*, offering a continued exploration of the central questions driving contemporary cosmological research. Dodelson emphasizes that Einstein’s development of general relativity marked a turning point – enabling, for the first time in history, the formulation of a credible and testable theory of the Universe. The discovery that the Universe is expanding and that it originated from a much hotter and denser state reframes age-old existential questions

such as “Why are we here?” and “How did we get here?” within a modern scientific context (Dodelson, 2021: 1).

Cosmology has abstract nature, but plays a crucial role in framing humanity’s place within the Universe, reshaping perspectives on human existence. This discipline provides a rational foundation for understanding what it means to be part of the cosmos and how this understanding influences our worldview. This underscores the necessity for continued development within philosophical cosmology, particularly the pursuit of novel methodological approaches, some of which may be informed by the ordinary language philosophy.

Cosmology should be understood as a unique scientific branch of knowledge that aims to understand and explain the Universe in its entirety – spatially, temporally, and in terms of its physical properties and evolutionary processes. The Universe is a complex object with a hierarchical structure, which makes it necessary to use abstract ideal models that reveal fundamental patterns without compromising scientific accuracy. At the same time, cosmology is closely related to philosophy, considering deep questions about the origin, meaning, and future of both the Universe and human life in it. Accordingly, cosmology as a science performs not only an intellectual function, but also a worldview role, helping people understand their place in the cosmic order.

Philosophy of Cosmology

Since cosmology seeks to view the universe in its entirety, it requires a methodology that is different from that of the traditional physical sciences. The evolution and development of cosmological theories has therefore been accompanied by long-standing philosophical debates that point to significant methodological and epistemological disagreements at the intersection of cosmology and other branches of physics. Unlike physics, which studies repetitive phenomena under controlled laboratory conditions, cosmology seeks to describe the universe as a whole. This uniqueness of its subject matter fuels ongoing debates about the need for a specialized scientific methodology specifically adapted to cosmology. Consequently, the philosophy of cosmology is often regarded as a subset of the philosophy of physics.

In 2007, Elsevier published *Philosophy of Physics, Part B*, edited by J. Butterfield and J. Ehrman, which included a section on “Issues in the philosophy of cosmology” organized by George F. R. Ellis. A foundational definition of cosmology, cited at the outset of this article, frames it as “Cosmology is the study of the large-scale structure of the Universe, where “the Universe” means all that exists in a physical sense” (Ellis, 2007: 1183).

A central challenge in cosmology is the inherent limitation of empirical verification due to the impracticality of experimental testing. There are some limitations: the cosmological horizon, the finite observable universe, and the inability to reproduce cosmological conditions in the laboratory. This creates significant obstacles to direct testing of hypotheses. In particular, scientific theories about the “origin” of the universe often do not fit the generally accepted framework of physical theories. Physical theories generate testable predictions under controlled conditions. This puts cosmology in a unique position on the border between empirical physics and philosophical interpretations of reality.

Multiverse theories and the anthropic principle, which have some contradictions, have sparked lively debates about their scientific validity and metaphysical implications. These discussions focus on the difficulty of evaluating such theories without direct empirical access to other proposed “universes”. Questions arise about the appropriateness of the anthropic principle. This principle states that the parameters of our universe must be compatible with the presence of observers. This, therefore, requires an interpretation of the “fine-tuning” of

physical constants. The main dilemma is whether these considerations qualify as scientific arguments. Perhaps they remain largely heuristic or metaphysical in nature.

Philosophical discourse in cosmology underscores the tension between its scientific aspirations and methodological constraints. The 2019 publication *The Oxford Handbook to the History of Modern Cosmology* by Oxford University Press features an article by Chris Smeenk titled “Philosophical Aspects of Cosmology.” The authors note: “Throughout the last century, cosmologists have revisited, time and again, basic questions regarding the appropriate aims of cosmology and how best to achieve them. These debates reflect a tension between the cosmologists’ ambitions to provide a scientific account of the structure, evolution, and origins of the universe, and methodological limitations imposed by cosmology’s unusual object of study.” (Smeenk, 2019: 539). Cosmology is inherently interdisciplinary, integrating physics, philosophy, and metaphysics. In this context, it goes beyond the boundaries of classical science. Its methodological features raise questions that are often impossible to resolve within the framework of traditional scientific paradigms. This makes cosmology fertile ground for deep philosophical reflections.

Modern cosmology emerges as an interdisciplinary and methodologically complex science. This requires a special approach to understanding reality. The unique and unique nature of its subject – the Universe – imposes limitations on the applicability of standard empirical methods. This calls into question the possibility of a comprehensive scientific verification of cosmological hypotheses. Multiverse and the anthropic principle occupy the border between physical theory and metaphysical speculation and nowadays generate significant intellectual tension. This dynamic contributes to philosophical debates about the status of cosmology as a science and its epistemological limits. Cosmology occupies a unique place at the intersection of science and philosophy. It requires researchers to remain open to a variety of rational modes of inquiry.

Another important source is *Philosophical Cosmology*, published by Cambridge University Press in 2017. Cosmology stands as a quintessentially integrative discipline, encompassing a broad spectrum of physical theories and methodologies – including general relativity, quantum field theory, statistical mechanics, thermodynamics, high-energy physics, and nuclear physics. Its analytical framework incorporates theories of structure formation, astrophysics, and elements of condensed matter physics. Cosmology serves as a point of convergence between two fundamental disciplines. It seeks to build a comprehensive model of the evolution of the Universe from the earliest moments to the present.

Experimental cosmology relies on advanced and expensive technologies that expand observational capabilities over time. These tools include ground-based particle accelerators and neutrino detectors, as well as space telescopes and satellite observatories, including Hubble, WMAP, and Planck. Of particular note is the recent detection of gravitational waves from black hole mergers. This opens a new observational window for high-energy astrophysical phenomena and the epochs of the formation of the Universe. Our era is rightly called the “golden age of cosmology,” with unprecedented increase in both the volume and quality of empirical data.

Theoretical physics faces ongoing challenges in unifying disparate models into a single coherent framework for the Universe. This effort reveals tensions between fundamental principles – such as those between quantum mechanics and general relativity, or between the naturalness criterion of the Standard Model and considerations related to the cosmological constant and dark energy. Cosmology elevates the significance of initial conditions. It is

crucial in fields like statistical mechanics, where they influence the directionality of time and localized thermodynamic behavior.

Some key questions in contemporary cosmology are inherently philosophical, extending beyond the scope of physical theory. Additional complexities arise from philosophical problems intrinsic to physics itself, including the measurement problem in quantum mechanics, the “fine-tuning” of Standard Model parameters (notably the Higgs boson mass and cosmological constant), the black hole information paradox, and the elusive nature of dark matter. These factors contribute to a uniquely complex but intellectually fertile scientific landscape that demands an interdisciplinary approach incorporating philosophical inquiry.

Despite skepticism from some within the scientific community, philosophical considerations remain inseparable from cosmological research. In many cases, scientists engage with philosophical issues implicitly, especially when addressing epistemological or metaphysical aspects of their work. However, traditional philosophy of physics has predominantly concentrated on formalized theories in their idealized forms, often neglecting the complex and heterogeneous scenarios characteristic of cosmology – a field that resists simple axiomatization by its very nature.

Khalil Chamcham, in the preface to *Philosophical Cosmology*, observes: “For all of that, ‘philosophy of cosmology’ as a body of philosophical literature engaged with contemporary cosmology does not yet exist. This book marks a beginning. In it we have gathered essays edging out from cosmological problems to philosophy, and from philosophical problems to cosmology; it is at the points at which they meet that we hope for the greatest synergies” (Chamcham, 2017: xi).

In conclusion, modern cosmology evolves at the intersection of cutting-edge experimentation, theoretical synthesis, and profound philosophical reflection. Highly sophisticated observational instruments enable exploration of increasingly remote epochs of the Universe, yet integrating these empirical findings with diverse theoretical models remains a significant challenge. Several core cosmological questions, such as pertaining to the origin, structure, and limits of the Universe – cannot be fully addressed by physical theories alone. These challenges necessitate philosophical engagement, which, despite some scientific skepticism, constitutes an essential component of cosmological understanding. The establishment of philosophy of cosmology as a distinct academic discipline is in its early stages, but this emerging field holds significant potential to bridge natural science breakthroughs with fundamental metaphysical questions about the nature of reality.

Some methodological challenges and prospects

Despite significant technological and theoretical advances, methodological and epistemological challenges in cosmology persist. Philosophy has historically played a crucial role in cosmological inquiry, with some scholars linking the central problem of the philosophy of cosmology to Karl Popper’s so-called “problem of cosmology”: namely, how to understand the world – and ourselves – as integral parts of that world. While cosmology has long served as fertile ground for philosophical reflection, a clearly defined field known as the “philosophy of cosmology” has yet to emerge as a distinct branch within academic literature.

Important to mention a notable contributor to this discourse – C. Smeenk. In his article “Philosophy of Cosmology” he offers a distinctive perspective on the role of this scientific discipline. Over recent decades, cosmology has experienced remarkable growth and transformation. Once considered a marginal and speculative field in the 1960s, cosmology has

evolved into a central area of fundamental research, underpinned by the Standard Cosmological Model and supported by extensive observational evidence (Smeenk, 2013:607-652).

Philosophical considerations have been integral to cosmology since well before the 1965 discovery of the cosmic microwave background. Early debates addressed empirical findings and foundations of the scientific method, and also the limits of scientific explanation, and cosmology's place within the physical sciences. Despite rapid advancements in observational technology and the mathematical rigor of theoretical frameworks, profound methodological and epistemological questions remain unresolved. Even with impressive discoveries such as the expanding Universe and dark energy, critical issues surrounding the reliability, validity, and boundaries of scientific knowledge in cosmology persist. Unlike many other physical sciences, cosmology confronts unique constraints in empirical access because its subject – the Universe – is singular, inaccessible to controlled experimentation, and beyond complete direct observation.

These characteristics give rise to fundamental philosophical questions. For instance, is it possible to develop a truly scientific theory of the “Universe as a whole,” and if so, what criteria must such a theory meet to be considered scientifically valid? Physical models that extend local physical laws to cosmic scales encounter inherent limitations. In some reasons because of the finite speed of light and the presence of cosmological horizons, which restrict direct observation and determination of the Universe's global properties. Many theoretical extrapolations – such as those concerning dark matter and dark energy – rest on the assumption that the general theory of relativity is universally applicable, though this theory may be incomplete at cosmological scales.

Cosmology also uniquely grapples with the problem of initial conditions. Unlike other physical sciences, where initial or boundary conditions are inputs for modeling phenomena, in cosmology, the Universe's initial state itself often becomes the subject of scientific explanation. The anthropic principle includes the presence of observers in the framework of the explanation, which complicates the formulation of probabilistic estimates. Thus, the interaction between the conditions of observation and the object of study becomes of some importance.

The analysis of the oldest evolutionary stages of the Universe presents significant difficulties. These difficulties may be the only context for evaluating hypothetical theories of quantum gravity. However, the lack of a well-defined dynamics governing the initial state, combined with limited empirical data, severely limits the possibilities of direct experimental testing of such models.

The Universe is a unic object which calls into question the traditional distinction between the laws of nature and the initial conditions, making it not always applicable. The fundamental questions raised by cosmology force a reassessment of classical concepts related to the scientific method, explanation, and prediction. Cosmologists frequently encounter situations where theoretical frameworks advance beyond the scope of empirical verification; although some key hypotheses remain unconfirmed by observation, they retain significant heuristic value.

Despite these inherent challenges, several findings, especially concerning the cosmic microwave background and large-scale structure – demonstrate a level of reliability comparable to other branches of physics. In some cases, this underscores cosmology's capacity to generate robust scientific knowledge despite its methodological constraints. Comprehensive philosophical reflection is essential to fully grasp the range of challenges and opportunities that cosmology presents.

Philosophical analysis within cosmology is fragmented. Some philosophers have made meaningful contributions, but the majority of conceptual development occurs within the cosmological community itself. This dynamic presents both risks and opportunities. On one hand, there is the danger of uncritical interpretations of foundational concepts; on the other, it creates fertile ground for interdisciplinary synergy that can redefine not only cosmological frameworks but also the philosophical foundations of physical reality.

Thus, cosmology has evolved from a peripheral field into a leading domain of fundamental knowledge. However, alongside this rise in authority, it has preserved – and in some cases intensified – a series of profound methodological and epistemological challenges. The singular nature of its object of study – the Universe as a whole – and the inherent limitations in observational capacity make comprehensive experimental validation of many theories impossible. This situation requires a reassessment of traditional scientific methodologies.

The question of initial conditions remains important in cosmology. In classical physical models, initial conditions serve as input for explanations. But, in cosmology, they often become the subject of explanation themselves. Nevertheless, modern cosmology consistently produces highly reliable results in specific areas, such as the study of the cosmic microwave background and primordial nucleosynthesis. Philosophical interpretation of these findings remains largely confined within the cosmological discipline. A circumstance that carries both the risk of intellectual insularity and the potential to foster innovative interdisciplinary approaches.

Ordinary language philosophy and cosmology

The scientific dominance of the cognitive paradigm is marked by significant inertia, manifesting as resistance to paradigm shifts and a tendency to uphold established approaches, sometimes through the use of ad hoc assumptions. Recently, a large number of modern interdisciplinary studies have appeared in the fields of cognitive science, psychology, and philosophy. For example, cognitive science incorporates phenomenological methods and conceptual frameworks into its empirical account. It combines subjective experience with data-driven research (Rudenko, 2024). Alternative perspectives, that inspired by the philosophy of Ludwig Wittgenstein, offer profound critiques of reductionism and mechanistic explanations. They remain largely marginal within the dominant scientific discourse.

This raises a critical question: Is there potential for a conceptual breakthrough – an emergence of a non-mechanistic paradigm that can provide a fundamentally different understanding of language, thought, and mind? In this context, philosophical reflection of paragraph 608 in Wittgenstein's *Zettel* plays a central role to the analysis. This late philosophical fragment suggests that language and thought are not strictly governed by mechanical neuroprocesses but instead emerge from a certain “chaos,” a metaphor warranting careful hermeneutic consideration. In contrast to materialist interpretations, this passage is argued to have a religious-cosmological dimension. The ordinary language philosophy, founded by Ludwig Wittgenstein, can provide a solid methodological basis for further analysis of this concept. A comparable perspective is presented in Bazaluk's work “Aletheia vs. Truth: Socratic Logos for a Modern Understanding of the Universe”. The evolution of the term *alētheia* within the ancient philosophical tradition – and its later reinterpretation through the lenses of *verum* (“reality” or “realness”) and “truth” – obscured two core insights from Plato's thought that cannot be fully captured by the modern notion of “truth” (Bazaluk, 2024: 118).

Paragraph 608 has given rise to numerous interpretations. Some of them contradict the basic tenets of Wittgenstein's later philosophy. Notably, the so-called “neurological

interpretation” postulates that Wittgenstein is considering the possibility of language and thought arising from the physical chaos of brain processes.

All these interpretations share a common assumption: they equate the terms “center” and “chaos” in paragraph 608 with the neural center and neural chaos, implying that Wittgenstein hypothesizes language’s emergence from physiological brain disorder. (McDonough, 2014: 87) But, this interpretation faces some considerable criticism, primarily because it contradicts key epistemological and methodological principles, which are crucial for Wittgenstein’s later work.

Two fundamental issues undermine the neurological reading. First, the text of paragraph 608 itself does not support the claim that the brain is inherently chaotic. On the contrary, the second sentence explicitly states: “there is, I assume, a system of impulses going out from my brain and correlated with my spoken or written thoughts.” (Wittgenstein, 1967: 106) This suggests a presence of systematic order rather than chaos. Wittgenstein does not literally claim language emerges from chaos; rather, he employs a philosophical comparison likening language formation to the emergence of order from chaos – a technique typical of his later work, favoring philosophical analogies over systematic theorizing.

Second, Wittgenstein’s late philosophy consciously rejects speculative theorizing about “hidden” mechanisms. We can summarize his position as “what is hidden does not interest us,” which precludes neurological, physicalist, or reductionist explanations that rely on unobservable hypotheses such as quantum uncertainty or brain electric fields. Such approaches are fundamentally at odds with the spirit of Wittgenstein’s philosophical analysis as developed in *Philosophical Investigations* and *Zettel*. Indeed, in paragraph 447 of *Zettel*, Wittgenstein explicitly states that the goal of his philosophy is “to replace wild assumptions and explanations by a quiet weighing of linguistic facts.” None of the extravagant neurological interpretations align with this methodological ideal (Wittgenstein, 1967: 80).

The notion that, in paragraph 608, Wittgenstein suddenly develops a theory of language emerging from neural chaos or attempts to model the brain’s connectionist architecture does not withstand rigorous philological and philosophical scrutiny. His statement can be understood not as a formal conceptual proposition or theoretical framework, but as a philosophical analogy intended to provoke reflection and shift perspective, rather than to explain hidden mechanisms or causal processes. In this respect, paragraph 608 of *Zettel* exemplifies Wittgenstein’s style – eschewing theoretical speculation in favor of fostering new ways of perceiving familiar phenomena and opening space for philosophical analysis grounded in linguistic practice, free from metaphysical speculation (McDonough, 2021:112).

An interpretive problem arises because the text does not contain any statement that the brain impulse system extends to a specific “nerve center”. While this assumption is made in neuroscience discourse, it lacks clear support in the philosophical text. A close reading of paragraph 608 suggests otherwise: impulses travel from the brain to the “center,” not within it. This implies that the “center” referenced is not neuroanatomically localized but situated outside the physical boundaries of the body – in the external, public world.

Under this interpretation, “ordinary life” emerges as the true center around which language revolves. It is life in the shared social world, not brain processes, that provides the semantic framework for speech. This notion is further elaborated in *Remarks on the Foundations of Mathematics*, where the concept of the center of language is associated with life itself, rather than neural activity. In other words, language unfolds not within the biological structures of the brain, but within life practices that shape the public world.

This point of view challenges the dominant paradigm of cognitive science, which describes the brain as an autonomous center for information processing, intellectual control and speech production. Wittgenstein's view, expressed in paragraph 608 of *Zettel*, rejects this neurocentric model. Analogous to Copernicus's revolutionary re-centering of the cosmos by displacing Earth in favor of the Sun, Wittgenstein performs a "Copernican revolution" in the philosophy of language.

Instead of positioning the brain as the epicenter of thought and speech, the focus shifts to public, intersubjective activity within the "forms of life." Language and thought thus cease to be functions confined to a neural substrate and become characteristics of human engagement in shared social practices where lived experience takes place.

It is crucial to clarify that *Zettel* (paragraph 608) does not deny the brain's role as a necessary condition for thought. However, it rejects the conception of the brain as an autonomous center of intelligence. Thinking, therefore, is understood as the activity of the whole person – an organism embedded in the structures of the public world. Consequently, the determination of what constitutes the content of a thought or the meaning of a statement is not made by an isolated brain, but by the subject situated in their world – for instance, "Susan," who acts, speaks, and thinks within the context of her lived experience.

The analysis of fragment 608 of *Zettel*, which we can understand as a critique of reductionism, reveals an alternative philosophical perspective on the nature of language and thought. The Enlightenment tradition has been dominated by a mechanistic approach. This approach tends to reduce human consciousness to physiological and neural processes. But the philosophy of the later Wittgenstein proposes a somewhat different framework. In this conception, language is understood as a public phenomenon embedded in forms of life. Arguments against a neurological interpretation of this fragment are based on a reading of the text and Wittgenstein's philosophical foundations that reject speculation about "hidden" mental processes. Instead, the focus shifts to observable human behavior and everyday language use. This shift – from internal to external, from neural to intersubjective – has transformative consequences: thinking is understood as the activity of the whole person in a social and linguistic context.

This conclusion has important implications for the philosophy of cosmology. It challenges the dominant model that reduces complex phenomena to microphysical processes. Just as Wittgenstein rejects reducing language and thought to neural mechanisms, cosmological inquiry can also question attempts to explain the universe solely through mathematical models or local physical laws detached from human practice and interpretation.

This interdisciplinary shift – from reductionism to contextualism – creates an opportunity to view cosmology not merely as an objective description of the universe's structure, but also as a collective, public engagement with human existence in the cosmos. If language is rooted in life forms, then cosmological theories are part of the lifeworld, particularly the social practices that shape our understanding of the origin and structure of the universe. This perspective requires a reassessment of the role of cosmology as a discipline situated at the intersection of science, philosophy, and culture.

Conclusion

The analysis clearly demonstrates that modern cosmology is not merely a branch of fundamental natural science but an interdisciplinary framework that integrates physics, astronomy, and philosophy. Its goal of comprehending the Universe in its full spatio-temporal and physical-evolutionary context presents unique epistemological challenges – particularly

the impossibility of complete experimental verification and the inherent limitations of conventional observational methods. Modern cosmology requires contextualized understanding. In other words, it requires not a set of abstract equations, but a system of meanings that emerge in a socio-historical environment. This perspective invites us to consider cosmological theories as forms of cultural practice that reflect the structure of reality and the way humanity exists in that reality.

The emergence of the philosophy of cosmology is important for the advancement of scientific progress. It provides some basis for defining the limits of rational inquiry, clarifying the role of metaphysical assumptions, and placing cosmological models in the broader landscape of human knowledge. Cosmology thus goes beyond the boundaries of purely natural science, becoming a deep philosophical endeavor – one that shapes knowledge not only about the universe but also about our place in it.

Ordinary language philosophy, in particular its approach to linguistic analysis, offers methodological tools that can expand the scope of the philosophy of cosmology. Wittgenstein's *Zettel* is an example of significant potential of such an analytical framework. This underscores the need for further exploration into how the ordinary language philosophy can be effectively applied within the context of cosmological inquiry.

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Popularizing the Philosophy of Cosmology in the Ukrainian SSR in the Second Half of the 20th Century: Readers Discover the Secrets of the Micro-World and the Universe

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This article continues the review of the history of the philosophy of cosmology as a science in the Ukrainian SSR during the second half of the 20th century, building on our previous article. The main focus is on the progress made by academic and university science in Ukrainian philosophical and cosmological studies after World War II. After the harsh Stalinist repressions of the 1930s–1940s, the revival of knowledge about cosmology was followed by a flourishing of science popularization in post-Stalin Ukraine, centered around the Main Astronomical Observatory and other institutions of the Academy of Sciences of the Ukrainian SSR, universities, and the Society for the Dissemination of Political and Scientific Knowledge of the Ukrainian SSR (1947–1963), beginning in the mid-1960s. These ideas were mainly those of scientists from the Academy, university professors – particularly from Kyiv Shevchenko State University – and their international counterparts – from M. Copernicus and Sir I. Newton to A. Einstein, J. Jeans, H. Shapley, and S. Hawking – about the Cosmos. They were widely disseminated through children's and youth publishers like "Veselka," "Molod," and through publishing houses of higher education, notably "Kyiv University" and the Academy's publishing house, "Naukova Dumka." The development of non-classical science was initiated by S. Vsekhsviatytsky, V. Tsesevych, M. Omelyanovsky, and P. Dyshlevyi, and continued by I. Klymyshyn, E. Pashytskyi, Yu. Khramov, and others, indicating a postmodern neo-

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humanistic flowering of Ukrainian philosophy of cosmology, mainly supported by the International Society of Philosophy and Cosmology and its founder and leader, Oleg Bazaluk.

Keywords: philosophy of cosmology, Institute of Philosophy of the Academy of Sciences of the Ukrainian SSR, O. Bazaluk, S. Vsekhsviatskyi, M. Omelyanovsky, O. Bazaluk, P. Dyshlevyi, S. Vsekhsviatskyi, M. Omelyanovsky, V. Tseseych

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1. Introduction

The development of the philosophy of cosmology in Soviet Ukraine from the middle of the 1950s to the beginning of the 1970s was influenced by the slow but irreversible and increasingly noticeable Europeanization and humanization of academic and university science in the USSR during the post-Stalin era – most notably during Khrushchev’s “Thaw” and the start of the “stagnation” period. In the last third of the previous century, it matured and flourished as a significant area of national natural-scientific and, concurrently, humanitarian studies, primarily in the academic life of the Ukrainian SSR. During more than forty post-war years in the fate of our Homeland and the Ukrainian people were marked by the dominance of the totalitarian communist regime in Ukraine. Its policy of great-power chauvinism was also aimed at the development of domestic scientific thought independent of the official Marxist-Leninist ideology. The era of the “cold war” between the Eastern and Western military-political blocs, led respectively by the USSR and the USA, became a period of escalating “arms races” worldwide, and their extension beyond planetary boundaries in the Space Age. The previously unseen surge in fundamental scientific research and the onset of the Atomic Era in the context of a rapid scientific and technological revolution, particularly the exploration of space for military purposes, gave rise to a powerful public movement of peaceful resistance in various forms and manifestations. The political-military competitions of the USSR and the USA, as well as their satellite states in Africa, Latin America, Southeast and Central Asia, and Europe since the fall of the “Iron Curtain” in 1946, whose most dangerous expression was the notorious Cuban Missile Crisis of 1962, met with fairly active public opposition in the form of international anti-war and neo-anti-colonial movements. From the adoption at the third session of the UN General Assembly in 1948 of the “Universal Declaration of Human Rights” to the signing of the Helsinki Declaration or the Final Act of the Conference on Security and Cooperation in Europe in 1975, the global dialogue among the public, professional communities, and political elites regarding the collective definition of the peaceful -both terrestrial and cosmic – future of humanity was actively intensifying.

A bright example of professional, academic, and university-level reflection on the planetary prospects and threats of this process from a philosophical and cosmological perspective was the 15th World Congress of Philosophy held in Varna (1973), which was dedicated to discussing the pressing challenges of the Scientific and Technological Revolution (STR) at that time. The conclusion of agreements between the USA and the USSR a year earlier on the limitation of strategic arms and cooperation in the exploration and peaceful use of outer space – as well as the beginning of their joint space program “Apollo-Soyuz” – drew the participants’ close attention to the need to rethink the relationship between scientific knowledge and moral values in the “scientific-technological era.” The Ukrainian delegate to this congress, Director of the Institute of Philosophy of the Academy of Sciences of the Ukrainian SSR, V. Shynkaruk, had published

a related article two years prior to the congress in the journal “Philosophical Thought,” which he then edited. The article was soon republished in the annual publication of the Academy of Sciences of the Ukrainian SSR and the “Knowledge” Society of the Ukrainian SSR – “Science and Culture. Ukraine”, and was devoted specifically to this topic (Shynkaruk, 1971). According to his view, since early modern times in human history, there have been two stages in the progress of technical means of social production, or “historical phases” – instrumentalization and mechanization, the latter of which coincided with the industrial upheaval of the 18th–19th centuries. The third phase, which began in the 20th century – automation – is a qualitatively new stage in the evolution of technology and humanity, and constitutes the essence of the STR: “... this is the historical stage in the development of scientific knowledge and technical mastery of the forces of nature, when scientific achievements fundamentally change all the main factors of social production – energy (atomic and thermonuclear energy), materials (synthesis of substances with predetermined properties), communications and control (radio electronics, cybernetics, computer technology, etc.), communications (space rocket technology, and more)” (Shynkaruk, 1971: 35). As a stage in which society delegates to technology the higher functions of its productive activity – control, management of machines and technological processes – this phase leads to global and even supra planetary automation of social production.

The wide range of topics in philosophical and cosmological studies, which were successfully researched by V. Shynkaruk and his colleagues from both the Institute of Philosophy of the Academy of Sciences of the Ukrainian SSR and the Faculty of Philosophy at Kyiv Shevchenko State University, caught the attention of our academic and higher education science community. It is also worth recalling the figures of the “Kyiv philosophical circle” of the 1960s–1980s – O. Pohorilyi and G. Vdovychenko, who have been well known to us since our youth as researchers in this field. A model of creative collaboration on this topic between philosophers and astronomers of Kyiv Shevchenko State University from different generations was found in the communication on current issues of astrophysics between O. Pohorilyi, then a student of the Faculty of Philosophy, and the head of the Department of Astronomy, Professor S. Vsekhsviatskyi. O. Pohorilyi’s scientific research under his guidance at the Astronomical Observatory of the same university in the 1960s allowed him, as a fifth year student, to publish in 1962, in one of the leading philosophical periodicals of the USSR at that time – “Philosophical Sciences” journal – his first article under a title particularly relevant to the theme of our publication: “On the Philosophical Essence of the Cosmological Problem” (Pohorilyi Oleksandr Ivanovych: Biobibliographical Index, 2000: 5-6). The scientific collaboration of their colleague – then Head of the Department of Philosophy at the Institute of Advanced Training of the same university, Professor G. Vdovychenko – with V. Shynkaruk and scholars from several institutes of the Academy of Sciences of the Ukrainian SSR (Vdovychenko, 2024: 165–166) – was no less interesting and significant. This work was carried out in the field of reviewing and popularizing the “philosophy of scientific worldview,” specifically regarding the deep learning of the Copenhagen interpretation of quantum physics. This valuable experience of our close relatives, who have for many years been disseminators of knowledge about the achievements in astronomy, cybernetics, cosmology, philosophy, and physics, attracted the attention of the authors from their youth until today, first of all in their article (Vdovychenko & Pohorilyi, 2025), to a broad array of domestic – mainly Ukrainian-language – popular science items of the 19th and 20th centuries in the fields of philosophy of cosmology and the related natural science and humanities topics.

The horizon of our interest in them stretched from now somewhat forgotten rare books issued by the publishing houses of the Ukrainian SSR for children and youth – “Veselka,”

“Molod,” “Radyanska Shkola” – and their “senior comrades,” that is, the metropolitan and regional publishing outfits, such as “Promin” in Dnipro, to the books of university publishing offices like “Kyiv University,” and the Academy of Sciences of the Ukrainian SSR’s “Naukova Dumka.” Our long-standing engagement with this – our very first scientific experience – both in our school and student years and later, in our mature years, allows us to assert the crucial role of Ukraine’s publishing practices of the mid-1950s to the 1980s in the neo-humanistic flourishing of academic and university-level studies in the philosophy of cosmology in the Ukrainian SSR after the death of J. Stalin. We are both familiar – through the publications of those decades – with the legacy of its creators: from the now largely forgotten O. Averbukh, H. Karpenko, N. Rozenblitt, and I. Kharchenko, to the world-renowned names of doctors of physical and mathematical sciences: O. Akhiezer, S. Braude, S. Vsekhsviatskyi, and M. Omelyanovsky, as well as E. Pashytskyi, Yu. Khramov, V. Tseseych, K. Churyumov, V. Shelest. This rich legacy was a vital catalyst in the previously unprecedented process in the Ukrainian SSR of studying and popularizing the mysteries and enigmas of microcosmic and universal history. A retrospective examination of this process led us to identify three main directions or thematic blocks of their research into the philosophy of cosmology: 1. the history of the Cosmos, primarily the Solar System; 2. the history of the Earth; 3. the history of planetary flora and fauna, especially that of humankind. We turned to many works: from “Conversation about the Universe” (1953) by V. Tseseych and “How the Universe Was Studied” (1954) by S. Vsekhsviatskyi, as well as a series of articles by the latter – most notably “New Discoveries in the Study of Cosmic Phenomena” (1956) – to the exceptionally colourful palette of studies by their colleagues and successors. According to our review, astronomers, cyberneticists, cosmologists, mathematicians, physicists, philosophers, and others all worked together to create a process of extraordinary scope and importance that was unheard of in our scientific and public life. This process helped Ukrainian society develop a sense of itself as a planetary and cohesive personality of cosmic scope.

2. The Promotion of Cosmology in the USSR in the Second Half of the 20th Century: Postmodern Progress of Ukrainian SSR Scientists in the Context of Soviet Experience

In the 1960s-1980s, scientific & socio-cultural life in the Ukrainian SSR and, more broadly, the USSR, saw growing interest among both academic and university researchers and the wider public in the origins and history of the Universe. This was largely triggered by the dawn of the Space Age on October 4, 1957, a landmark date in human history. The wide array of scientific and popular science publications in the USSR over these thirty-plus years – following the launch of the first artificial satellite, “Sputnik-1,” and especially after the conclusion of the “Vostok-1” mission in April 1961 & “Apollo-11” in July 1969 – impresses with its thematic diversity and extraordinary scope. The very majority of periodical publications and monographs, as well as collected articles, documents and materials, encyclopaedic reference books, and instructional literature on this subject – including epistolary and memoir publications – were issued by nearly twenty well-known publishers in the capitals of the USSR and the RSFSR. A significant segment was produced by publishing houses for children and youth, such as “Children’s Literature,” “Pedagogy,” and “Young Guard,” which offered the USSR’s millions-strong youth audience popular science works typically published in runs of 30,000 to 100,000 copies. There were also hundreds of cosmology-related articles in the highly popular journals “Technology

for the Youth” (since 1933) and “Science and Life” (since 1934), as well as numerous editions of classical cosmological works – for example, by the most famous descendant of Severyn Nalyvaiko, the founder of “cosmic pantheism,” K. Tsiolkovsky. Young readers then could choose from an extremely varied range of cosmological publications: from classic school astronomy textbooks by B. Vorontsov-Velyaminov to such titles as “Cosmonautics. Small Encyclopaedia” (1968) & “Encyclopaedic Dictionary of the Young Astronomer” (1986). Worthy of special mention among these is the brief chronological guide “Astronomy and Cosmonautics” (1968), published in Ukrainian by “Naukova Dumka” and authored by S. Selesnikov, then a member of the USSR Academy of Sciences’ Commission on the History of Astronomy. And no less enlightening was the contribution of publishing offices like “Politizdat” and “Prosveshchenie” at the time, in particular the series “Philosophical Library for Youth” from the former, and “The New in Science” from the latter.

Both this and many other publishing houses in the RSFSR, such as “Mashynobuduvannya,” offered young and adult readers an interesting – though undeniably politicized in the Marxist-Leninist spirit – view of space exploration from ancient times to post-modernity. Tens of thousands of their publications highlight both well-known and lesser-known aspects of studying the Universe, along with advancements in rocket engineering and the exploration of interstellar space. A significant educational mission was carried out at that time by numerous scientific studies of a prominent native of Dnipro – a historian of astronomy and an investigator in astrophysics, such as the author of a morphological index of 30,000 galaxies, a collaborator at the Astrophysical Institute since 1924, B. Vorontsov-Velyaminov. His work “Galaxies, Nebulae, and Explosions in the Universe” (1967), just like other studies, was read then with no less enthusiasm than the books by one of the founders of UFOlogy in the USSR, F. Zigel. The author of works familiar to us from our youth, such as “Treasures of the Starry Sky: A Guide to the Constellations and the Moon” (1987) and “Astronomy in its Development” (1988), he initiated the creation in 1967 of the UFO division within the All-Union Committee on Cosmonautics of DOSAAF and the publication of the suppressed collected papers “Inhabited Cosmos” (1972) with materials on extraterrestrial civilizations. A significant mark in the history of popularizing the philosophy of cosmology in the USSR was also left by works like “Black Holes and the Universe” (1985), authored by the known theorist of relativistic effects in binary systems, head of the relativistic astrophysics sector at the Institute of Space Research of the USSR Academy of Sciences, I. Novikov. It is worth noting that during those years, most of the attention of young readers in the Ukrainian SSR and the USSR was drawn to collections of materials, memoirs, and other publications dedicated to the biographies of the first cosmonauts and designers of rocket and space systems. Foremost among the latter, in terms of popularity, was, without a doubt, the native of Zhytomyr, S. Korolev, while among the former, his compatriots – the Ukrainian cosmonauts P. Popovych and H. Berehovi were no less well-known. Their memoirs and works about them were repeatedly published in their homeland, including the book issued by “Molod” by M. Kotysh, “I Go, Galaxy” (1963), about P. Popovych, and the memoirs of G. Berehovi, “The Sky Begins on Earth” (1976).

A notable portion of the body of work on the history of space exploration in the USSR for peaceful purposes consists of album publications from the 1970s and 1980s dedicated to the analysis of international cooperation in this field among countries of the Eastern and Western blocs and the “Third World,” such as “Soyuz-Apollo” (1975), “Continents Meet in Space” (1980), “Salyut-6: Orbits of Peace and Friendship” (1981), “USSR-France: In Space Orbits” (1982), “USSR-India: The Road to the Stars” (1984), and others. Well-known and beloved works on this topic, opening up intergalactic vistas for children and school youth, based on the

entire body of knowledge gained on Earth and in space, were, for example, the books “Space: A Working Platform” (1978) by V. Shatalov and M. Rebrov, and “I Want to Be a Cosmonaut!” (1983) by R. Koshurnikova. Both of these, like the other types of editions mentioned above, vividly demonstrate a trend toward the essential combination of practical, hands-on earthly and cosmic research experience, varying degrees of popularization, and all past and present experiences of studying the starry sky and the universe. Brilliant examples of such a synthesis, favoured by the authors of this article during their school and student years, were translated editions by scientists from the so-called socialist camp, “free world,” and “third world” countries, published mainly in the 1970s and 1980s by the publishing house “Mir.” Their distinguished list includes, in particular, monographs by scientists from France (“Experimental Astronomy” (1973) by J. Pecker), USA (“The Sun Family. Planets and Moons of the Solar System” (1984) by F. L. Whipple), Italy (“Essays on the Universe” (1985) by T. Regge), etc. Other books from the same publisher were no less interesting, captivating with their scale and depth of analysis, such as “Discoverers of the Sky” (1981) by D. Herrmann, the director of the Berlin Observatory from the German Democratic Republic, and “Stargazers of Antiquity” (1991) by N. Nikolov and V. Kharalampiev from the People’s Republic of Bulgaria.

Scientific and other publishing houses of the Ukrainian SSR, primarily “Naukova Dumka,” actively published and republished works by Soviet and foreign cosmologists in Russian and Ukrainian. However, all too often, books by our renowned scientists and their younger colleagues were published in the Ukrainian SSR only in Russian – for example, the work “Radio Waves Tell About the Universe” (1982) by the classics of astrophysics, Academician of the Academy of Sciences of the Ukrainian SSR S. Braude and scientist of the Institute of Radiophysics and Electronics of this Academy V. Kontorovych. At the same time, only one monograph – “Evolution of the Physical Picture of the World” (1973), by the world-famous Academician of the Academy of Sciences of the Ukrainian SSR O. Akhiezer – was published in those years in Ukrainian. This is clear evidence of the administratively imposed, repressive monolingual Russian-language practice in domestic publishing by the authorities from the dawn of the “stagnation” era in the mid-1960s until the collapse of the USSR. This practice was an important component of the great-power and chauvinistic policy of Russification being enacted at the time in domestic educational, scientific, cultural, artistic, and socio-political life. A telling example of the one is the publication in 1990 at the Glushkov Institute of Cybernetics of the said Academy of three volumes of selected works by its founder, all in Russian. However, the very same institute, on his initiative, published the first “Encyclopaedia of Cybernetics” in the world in 1973, and it was entirely in Ukrainian. However, despite these and many other such striking manifestations of the neo-imperial and neo-colonial policies of the Moscow authorities and their proxies in Kyiv, domestic academic and higher-education science preserved and creatively developed the powerful impulse for Ukrainian cultural, state, and national formation that had originated during Khrushchev’s “Thaw” of the mid-1950s to the mid-1960s. The scientific and ruling elite of the Ukrainian SSR in the 1950s and the 1960s systematically, both formally and informally, opposed the Russian and Russian-language segment’s quantitative and qualitative dominance of Soviet academic and other publishing, which was prevalent in the USSR with the support and patronage of Moscow authorities. In fact, it was the real, but a restrained continuation of the “Ukrainization” policy of the 1920s.

It is noteworthy that Ukrainian academic and university science in the second half of the last century, starting from the periods of “leadership” in the Ukrainian SSR during the post-Stalin era of the three first secretaries of the Central Committee of the Communist Party of Ukraine – O. Kyrychenko (1957 – 1963), M. Podgorny (1957 – 1963), and, mainly, P. Shelest (1963 – 1972)

increasingly occupied leading positions in the scientific life of the USSR and gained confidence as it entered the world stage. Hundreds of publications from pioneering figures in microcosm and space research from the Ukrainian SSR, such as O. Akhiezer, S. Braude, S. Vsekhsviatskyi, and V. Tsesevych, as well as their colleagues P. Dyshlevyi, I. Klymyshyn, M. Omelyanovsky, E. Pashytskyi, Yu. Khramov, and V. Shelest were published, primarily by publishing houses in the USSR capital. Most of their work was published in Russian, including the extensive onomastics research on space by Ukrainian author (Karpenko, 1981), which was released by the “Nauka” publishing house. However, Ukrainian philosophy of cosmology can take pride in the fact that many works – such as (Klymyshyn, 1983) by one of its leading figures in the Ukrainian SSR and later Ukraine, Doctor of Physical and Mathematical Sciences I. Klymyshyn – were published by the USSR Academy of Sciences’ “Nauka” in Moscow only as translations from Ukrainian before the collapse of the USSR in 1991. According to the authoritative participant in the revitalization of educational and scientific life in the Ukrainian SSR – the Secretary of the Communist Party of Ukraine Central Committee for ideological affairs from 1968 to 1972, academician of the Ukrainian SSR Academy of Sciences F. Ovcharenko – prior to his appointment he received the following “parting advice” from then General Secretary of the CPSU Central Committee L. Brezhnev: “...intensify the fight against Ukrainian bourgeois nationalism and in every way accelerate the assimilation of the Ukrainian nation” (Ovcharenko, 2000: 163). He was dismissed from his post in 1972 for not fulfilling this directive, following the recommendation of P. Shelest’s successor, V. Shcherbytsky. V. Ovcharenko contributed to the development of native academic and university science, including at the Institute of Philosophy of the same Academy. The head of the “Znannia” Society of the Ukrainian SSR from 1964 to 1968, he initiated in 1966 the launch of a Ukrainian-language annual by this society and the Academy of Sciences of the Ukrainian SSR, with the apt title “Science and Culture. Ukraine”. The one became significant for spreading both native and world science, including the philosophy of cosmology.

In 1956 – 1958, as head of the Department of Science and Culture of the Central Committee of the Communist Party of Ukraine, F. Ovcharenko consistently raised in his diaries of those years the issue of organizing and popularizing academic and university scientific research work in Ukraine. His notes from 1956 to 1972 are among the few frank professional testimonies about the systemic crisis in this sphere following the Stalinist repressions and its gradual overcoming during the Khrushchev’s “Thaw,” particularly in the Institute of Philosophy of the Academy of Sciences of the Ukrainian SSR and at Kyiv Shevchenko State University. A notable milestone was the publication in 1966 by the “Naukova Dumka” publishing house – produced by these institutions – of the first, and remarkably, Ukrainian-language history of national philosophical thought in the Ukrainian SSR (“Outline of the History of Philosophy in Ukraine,” 1966). Conceived from a clear anti-Stalinist and neo-Marxist perspective, this work, for the first time in the Ukrainian SSR, presented to domestic students and general readers the contributions of our thinkers from the Middle Ages to the 20th century to the world’s understanding of the mysteries of the microcosm and the Universe. Attention is drawn to Subsection 3, “Philosophical Problems of Contemporary Natural Science,” the concluding (seventh) section of these essays. Its author, P. Dyshlevyi, head of the Department of Philosophical Issues of Natural Science at this Institute, together with his colleagues M. Rozhenko and O. Kravchenko, also wrote at that time a study entitled “Philosophy and Physics” (1967) on the subject. Explaining the topic interestingly and professionally, albeit concisely – unlike the mentioned work – in the outline, he presented the famous contribution of the Ukrainian SSR and the USSR to the study of the Universe and the cosmos of elementary particles: “New data have been obtained about

the structure of our Galaxy and the Metagalaxy, about the existence of radio galaxies with powerful emissions, about the nature of the magnetic and electric fields of stars and galaxies, of interstellar and intergalactic space, and so on. Substantial results have also been achieved in the field of planetary and satellite studies of the Solar System. In connection with the application of the general theory of relativity to cosmology (relativistic cosmology), new results have been reached in the study of the structure of the part of the Universe known to us” (“Outline of the History of Philosophy in Ukraine,” 1966: 622-623).

Emphasizing that Soviet cosmonautics ushered in a “new era” in the history of space exploration and astronomy’s advancement, P. Dyshlevyi also highlighted the prominent role of the Institute of Physics of the Academy of Sciences of the Ukrainian SSR, as well as the Kharkiv Institute of Physics and Technology, in “uncovering the secrets of the atomic nucleus and the nature of elementary particles.” According to him, creating theories about these remains the central problem in modern physics. On several pages of this publication, he synthesized the main issues of the fundamental and applied studies conducted by the institutes of the same Academy – a topic increasingly analyzed by him and his philosopher colleagues in the relatively scarce philosophical periodicals of the Ukrainian SSR then. These included the Kyiv Shevchenko State University bulletin “Issues of Philosophical Sciences,” the interdepartmental scientific collection “Problems of Philosophy,” and, from 1969 onward, the sole specialized academic philosophical journal of the Academy of Sciences of the Ukrainian SSR: “Philosophical Thought.” For almost ten years prior to its appearance, scholarly contributions by members of the Scientific Council on the Problem of “Philosophical Questions of Contemporary Natural Science,” established in 1961 under the Presidium of the said Academy, began to appear in various papers of the one and other Ukrainian periodicals. Headed by V. Glushkov and, from 1971, by P. Dyshlevyi, this council coordinated all scientific research in this field throughout the Ukrainian SSR and held 13 conferences, symposia, and meetings of both all-union and republican significance from 1961 to 1970 (Rozhenko, 1971). One of its notable contributions to the popularization of the philosophy of postmodern cosmology was the collective monograph “Philosophical Problems of Einstein’s Theory of Gravitation and Relativistic Cosmology” (1965). The most renowned public forum for academic and university-based science in the 1960s to the 1980s was the annual publication “Science and Culture. Ukraine.” It masterfully summarized and showcased both the achievements of the philosophical community of the Ukrainian SSR and the scientific advances of its colleagues-researchers of the micro-world and the Cosmos. Throughout its pages, especially in the 1980s, numerous works by Ukrainian SSR scholars appeared on the topic of this article against the backdrop of international discourse. Among them was a noted report (Yatskiv, 1986) on the 19th General Assembly of the International Astronomical Union by then its vice-president, director of the Main Astronomical Observatory (MAO) of the Academy of Sciences of the Ukrainian SSR, Academician Ya. Yatskiv.

At the same time, the issues of this yearbook from the last third of the 20th century are filled with articles by equally renowned authors of that era – figures who have since become well-known in independent Ukraine and worldwide, representing several generations of creators in the philosophy of cosmology, especially classics of Ukrainian science from the Academy of Sciences of the Ukrainian SSR (Bondarchuk, 1971; Davydov, 1972). The contributions of subsequent generations of scientists, who are now actively working and making fruitful progress in Ukraine, are no less significant. For example, there are substantial articles about groundbreaking discoveries by researchers who were then still young – now prominent – in the Department of Planetary Physics at the Main Astronomical Observatory of the Academy of Sciences of the Ukrainian SSR (Morozhenko, 1986) and the Department of Radio Astronomy

at the Institute of Radiophysics and Electronics of the same Academy (Konovalenko, 1986). In our view, these last two publications are very important evidence of the breakthrough of both theoretical and applied aspects of the philosophy of cosmology in Ukraine, reaching a world-class level at the dawn of Gorbachev's "perestroika." As Chair of the Coordination Council of the "All-Union Comprehensive Program for the Study of Planets and Asteroids by Ground-Based Means in 1986 – 2000," O. Morozhenko participated in long-term studies on climate changes on the planets of the Solar System. At the same time, his colleague O. Konovalenko, in the second half of the 1970s, became part of a program for radio spectroscopic studies of cosmic radio emissions carried out using the UTR-2 radio telescope, assembled under the direction of S. Braude near Kharkiv. Thanks to their publications, the general public learned for the first time about the existence, on seven planets of this system – Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune – of a "complex thermodynamic machine," continuously operating for billions of years, namely, the "atmosphere plus surface system." They also drew attention to the close connection between the question of the origin of chemical elements and the mysteries of star formation, as well as the structure and evolution of galaxies themselves. During the last decade of the Ukrainian SSR, cosmological scientific and artistic projects from Veselka Publishing House (Korotkyi, 1986; Pashytskyi & Rozhen, 1989) drew significant reader attention – not only among youth but also from the general public. The first, reviewed by E. Hurtovenko, then head of the Department of Solar Physics at the Main Astronomical Observatory of the Academy of Sciences of the Ukrainian SSR, systematically examined the historical stages of studying the "mystery of the daytime star" – the Sun. The second, co-authored by then corresponding member of the National Academy of Sciences of Ukraine E. Pashytskyi, provides a brief overview of key achievements in both modern domestic and foreign astrophysics and cosmology.

The authors refer to a broad spectrum of retrospective professional assessments by both Ukrainian & foreign researchers, such as (Sazhyn & Sazhyna, 2007), of the history and core subjects of modern and postmodern cosmology, which allows for the acceptance of its division into mathematical (or theoretical), physical, and observational branches. Equally appropriate is the classification of its three most important topics along with the definition of the periods during which they were developed: 1. relic radiation and its anisotropy (1960s–1970s); 2. the accelerated expansion of our Universe and the causes of this phenomenon, known as "dark energy" (1980s); 3. studying of "dark matter" through the methods of gravitational lensing (since the 1990s) (Sazhyn & Sazhyna: 2007: 40). Numerous aspects of each of these have been addressed by entire cohorts of classical scholars from Ukrainian academic science, particularly in the fields of astronomy, cosmology, physics, and philosophy in the 1950s–1980s, who devoted dozens and hundreds of individual and collective scientific and popular science works to them. Without attempting to provide a condensed overview or explanation of all these works or any particular segment thereof, our aim was to present a generalized panoramic overview of the development of the philosophy of cosmology in the Ukrainian SSR in the second half of the twentieth century, using symptomatic examples of its popularization for readers of all ages and categories in Ukraine. The Institute of Philosophy of the Academy of Sciences of the Ukrainian SSR and the Faculty of Philosophy of Kyiv Shevchenko State University played a significant role in this process – first and foremost, the phenomenon now formally referred to as the "Kyiv School of Philosophy" of the second half of the 20th century, known as the post-war "Kyiv Philosophical Circle." The authors of this article, descendants of its once-renowned creators and heirs-popularizers of their research activity, such as in the work (Vdovychenko, 2024), found it worthwhile to focus on listing the key achievements of the promotion of philosophical and

cosmological issues in the post-Stalin period in the Ukrainian SSR, considering its development by the internationally recognized institutions of the Academy of Sciences of the Ukrainian SSR. Their review – from the end of the Stalin era and the dawn of the Khrushchev’s “Thaw” up to the end of Gorbachev’s “perestroika” – demonstrates, in our view, the confident return in the 1960s – 1980s of our philosophy of cosmology, as well as the academic and university-level science of the Ukrainian SSR in general, to the vital sources of European and world science.

3. From the Mystery of the “Earth Forge” to the Enigma of the “Sun Pyramid”: Dimensions of Cosmological Studies of “Man Steps into the Universe”

The spread of knowledge in the philosophy of cosmology in the post-war Ukrainian SSR began in the early days of the revival of academic and university life in the mid-1940s in the capital of Ukraine, Kyiv, as well as in Kharkiv and Odesa, which were university centres. The sources of this process, even during wartime, were such important scientific events as the founding of the Main Astronomical Observatory of the Academy of Sciences of the Ukrainian SSR in Kyiv in 1944, initiated by Academician O. Orlov, and the restoration of the astronomical observatory of Kyiv Shevchenko State University, founded in 1845, as well as the observatories in the two aforementioned cities. The origins of this initial stage of popularizing cosmology in the Ukrainian SSR during the 1950s and early 1960s cannot be understood without the mentioned periodicals, especially the little-known journal “Science and Life” published by the Society for the Dissemination of Political and Scientific Knowledge of the Ukrainian SSR (1947–1963). Under its first leader, the President of the Academy of Sciences of the Ukrainian SSR, Academician O. Palladin, the Society launched a widespread scientific and educational campaign across all regions: from lecture series to the creation of so-called “people’s universities.” An active participant in these efforts was also an editorial board member of the journal, co-creator, and one of the first lecturers at the Kyiv Planetarium (since 1952), S. Vsekhsviatskyi. The most renowned of the directors of the astronomical observatory of Kyiv Shevchenko State University, and the reviver of its work in the pre-war and post-war periods (1939–1952), as well as head of the astronomical section of the Kyiv branch of the All-Union Astronomical and Geodetic Society, he was a driving force and a symbol of the scientific-educational work in the field of philosophical cosmology in the Ukrainian SSR at the end of the Stalin era and in the post-Stalinist period of its history. His numerous works are illustrative achievements of this movement, from the article “The New in the Study of Cosmic Phenomena” (1956) and the fundamental study “Physical Characteristics of Comets” (1958), to the brochures “The Mysterious Rings of Saturn” (1972) and “New Insights about the Solar System” (1977). A common and underlying feature of these works is a broad vision of the principles and subject matter of philosophical and cosmological thought: from the interpretation of the “first revolution” (back in the 16th century) in natural science and the advance of the “conquest of space,” to revealing the connection between astronomy and geology.

As was eloquently demonstrated in one of his earliest popular works on this subject – the brochure “How the Universe Was Understood” (1954) – S. Vsekhsviatskyi began his quest with a thorough analysis of a broad range of ideas about the structure of the Universe: from archaic observations of the Moon to the latest achievements in theoretical astrophysics. In the references of this and other publications by the author over the next 30 years, many of which were issued by the “Znannia” Society of the Ukrainian SSR, such as the aforementioned titles and “New Discoveries about the Nature of Venus” (1968), we find an intriguing spectrum of domestic

and foreign studies. Alongside the Ukrainian-language list of publications – which, though not extensive, is notable – such as H. Konyk’s “Man, Cosmos, Philosophy” (1968), together with the both innovatively & orthodox collection of articles “V. I. Lenin and Philosophical Problems of Modernity” (1969) by the scholars of Kyiv Shevchenko State University edited by F. Yenevych, we encounter the works of prominent creators of cosmological philosophy known in the USSR and worldwide. These include, first and foremost, the innovative studies of S. Vsekhsviatskyi’s younger colleague – an honorary member of the Tsiolkovsky Academy of Cosmonautics, Doctor of Philosophy, and native of Kyiv, V. Kazutynsky. Remarkably, the inspiration for his monograph “Modern Astronomy and Dialectics” (1971), published in Ukrainian in Kyiv, was a study he published a decade earlier – written jointly with S. Vsekhsviatskyi – titled “The Birth of Worlds” (1961), dedicated to their favorite cosmogonic subject. An enthusiastic promoter of domestic science’s accomplishments in the study of stars – a proponent of ideas he regarded as “great harbingers of interplanetary conquest,” alongside K. Tsiolkovsky, M. Kibalchich, and Yu. Kondratyuk (Sharpei), as well as the achievements of the Main Astronomical Observatory of the Ukrainian SSR’s Academy of Sciences and other Ukrainian observatories – S. Vsekhsviatskyi frequently referenced works and ideas by astronomers and cosmologists from the free world that were suppressed in the USSR at that time, especially from the USA. Among these, let us recall the collections “Planets and Satellites” from the 1960s, edited by former Harvard Observatory staff member and US National Academy of Sciences member G. P. Kuiper. These also include the studies “Worlds in Collision” (1950) and “Earth in Upheaval” (1955) by the US scientist I. Velikovsky, a native of the Russian Empire and the creator of lurid unconventional theories in astronomy, geology, and history – particularly regarding global cosmic catastrophes and their influence on the history of Earth and humanity.

No less remarkable is the erudition and refined scientific style evident in the popular science works of his contemporary and colleague – the director of the Main Astronomical Observatory of the Academy of Sciences of the Ukrainian SSR from 1948 to 1951, and simultaneously of the Odessa Observatory, Corresponding Member of the same Academy, V. Tseseych. The author of one of the very first post-war cosmological works in Ukrainian in the USSR – “Talks on the Universe” (1953), published yet during the lifetime of J. Stalin and marked by the influence of Stalinist ideology – he nevertheless managed, no less insightfully and profoundly than S. Vsekhsviatskyi, to reveal the historical trajectory of humanity’s awareness of the starry sky. In many of his subsequent works over the following decades, such as the notably refined brochures “A Stroll by the Starry Sky” (1965) and “Lighthouses of the Universe” (1968), and later in the substantive monograph “What and How to Observe in the Sky” (1973), V. Tseseych combined a review of the progress of ancient astronomers with a thorough discussion of the topics of the evolution and nature of stars, emphasizing the philosophical significance of studying the cosmos. Both these scholars, along with most of their colleagues in the USSR and around the world, paid close attention to the significant achievements in cosmological research by two of the most renowned Soviet astronomers of the time, V. Fesenkov and V. Ambartsumian. A graduate and later lecturer at Kharkiv University, the former was the founder and director of the State Astrophysical Institute from 1922 to 1931 and one of the founders of astrophysics in the USSR. No less celebrated than the latter, V. Ambartsumian was an honored member of more than ten academies of sciences, the founder and first director of the Byurakan Astrophysical Observatory, and an academician of the USSR Academy of Sciences. Their undeniable achievements in atmospheric optics, stellar astronomy, celestial mechanics, and the physics of the Sun, Moon, stars, and planets – particularly the discovery (by the latter) of “stellar associations” – were topics of the First (1951) and Second (1952) Cosmogonical

Conferences of the USSR Academy of Sciences, as well as subjects of widespread popular scientific promotion.

Commenting on the results of the 8th General Assembly of the aforementioned International Astronomical Union, held in Rome in 1952, V. Tseseych, in his most renowned work of the 1950s, strikingly reflected the hostile stance of official Soviet science, especially astronomy, towards the “militant idealism” of Roman Catholicism, using the address by Pope Pius XII as an example. To the latter’s thesis that “the exploration of the Universe does not contradict religion,” Tseseych contrasted the views of J. Stalin and A. Zhdanov, summarized in the conclusion to the same book: “Materialist science about the Universe, relying on the revolutionary philosophy of dialectical materialism, armed with modern technology, will sweep away from its path all idealistic theories that obstruct its development” (Tseseych, 1953: 168). Framed within the broader official policy of the USSR – and Soviet, including philosophical, science – regarding the Roman Catholic Church and Neo-Thomism, this hot slogan echoed the position of the Soviet delegation at the 12th World Philosophical Congress in Venice (1958). At the same time, both S. Vsekhsviatskyi and V. Tseseych more actively incorporated data on the progress of contemporary world science into their works of the 1960s and 1970s. For example, the second often cited the ideas of co-creator of cosmology in Great Britain, Professor of Astronomy at the Royal Institution in London, J. H. Jeans. Outstanding experts on the history of astronomy, they emphasized the discoveries of V. Ambartsumian and V. Fesenkov “struck a crushing blow to various reactionary idealistic notions” of bourgeois science about the “simultaneous formation of all bodies in the Universe” (Tseseych, 1953: 158) and also acquainted mass readers with the concepts of their globally renowned foreign colleagues and opponents. These include the views of the creator of the “Jordan algebra,” the noted developer of quantum mechanics, P. Jordan, and, interestingly, the “planetesimal” hypothesis of T. Chamberlain and F. R. Molton from the USA. Cosmologists of the Ukrainian SSR critically analyzed these against the backdrop of the achievements of Soviet astronomy, such as the cosmogonic theory of the supporter of the nebular hypothesis, a graduate of St. Vladimir University in Kyiv and an academician of the Academy of Sciences of the USSR, O. Schmidt. Interestingly, from the pages of these censored texts by S. Vsekhsviatskyi, V. Tseseych, and their colleagues, in our view, there appears to be a hidden but quite intimate familiarity with the Ukrainian tradition of astronomical-cosmological studies of the period of the “Executed Renaissance,” which had been repressed by Stalinism in the 1930s in the Ukrainian SSR.

The tragedy “Faust and Death” (1960) by O. Levada is a great example of a single hidden reflection of these studies in Ukrainian drama of the 20th century. He, although incompletely and under censorship, covered the twists of both its creation and stage history in “the lyrical story-reflection” “The River’s Unceasing Flow” (1983) from the mention of the draft of the “poetic dramatic etude” back to 1938 to the first publishing of the tragedy’s extract in Russian in Pravda newspaper (May 1, 1960). Inspired by the works “Beyond Earth” by K. Tsiolkovsky and, at the same time, “Cybernetics and Society” by N. Wiener, O. Levada highlighted his studies of domestic and international astrophysics, cybernetics, electronics, nuclear physics, the theory of relativity, quantum mechanics, and other fields. A likely reason for his deep interest in the philosophy of cosmology was the criminal “Pulkov action” (1936–1937), in which one of the main figures was Borys Herasymovych, director of the Pulkovo Astronomical Observatory from 1933 to 1937. Among his colleagues at the observatory were other Ukrainian astronomers, notably Moris Eigenson, who worked there from 1934 to 1953, served as head of the Solar Service Department from 1938 to 1951, and held a Doctor of Physical and Mathematical Sciences degree. Professor at Lviv Franko State University since 1953, he was the director of

the university's astronomical observatory from 1953 to 1959 and was likely part of O. Levada's circle of communication during the period when he was writing the referenced tragedy. The remarkable body of Eigenson's work, especially the monograph "The Great Universe" (1936), marked a significant advancement in the development of Ukrainian cosmology philosophy, alongside the now largely forgotten explorations by his colleagues from the Kyiv Astronomical Observatory, primarily Serhii Chorny and Mykhailo Dychenko. A "Brief Outline of the Scientific and Pedagogical Activities of the Kyiv Astronomical Observatory from 1846 to 1932" (1933) by M. Dychenko is a prime example of the first reviews in Ukrainian of the domestic cosmology during the 85 years of the history of this institution. Its director in 1923-1939, a full member of the International Astronomical Union, Doctor of Physical and Mathematical Sciences S. Chorny made a major contribution to the promotion of cosmology. The author of the first Ukrainian textbook on descriptive astronomy in Ukrainian and also co-founder of the Ukrainian Society of Cosmology (1927-1935), he actively promoted the scientific studies of his colleagues in Ukraine and abroad. In particular, their papers were published in the periodicals of the said union, first of all, "Bulletin for Character Figures of Solar Phenomena" founded in 1927, and the oldest European journal of that kind since 1821 "Astronomische Nachrichten."

One of the main creators of this tradition with a tragic fate was a native of Kremenchuk – a graduate and lecturer at Kharkiv University, one of the first astrophysicists and specialists in stellar astronomy in the Ukrainian SSR, Doctor of Physical and Mathematical Sciences, and victim of Stalinist repressions, B. Herasymovych. As a researcher of the history of cosmology, he published in the journal "Chervonyi Shliakh" in 1923 the articles "Copernicus's Revolution" and "Evolution of Worlds in the Light of Modern Science." He was also the author of the world-renowned Ukrainian-language monograph "Physics of the Sun" (1933). As a gifted intern at the Harvard University Astronomical Observatory in 1926-1929, he prepared and published in the Ukrainian SSR a Ukrainian translation of a collection of works by its scientists ("The Stellar Universe," 1931) before the onset of the Holodomor and mass repressions. He noted in the foreword that in the 1910s-1920s, a veritable "geological" upheaval had occurred in the science of the Universe – its size and structure – after which astronomy transformed from a "purely geometric" science into a "physical" one. B. Herasymovych credited two main "schools" with this vast scientific progress in cosmology: "the observational work of powerful American observatories" and the research of "English theoreticians" ("The Stellar Universe," 1931: 3). As a student and colleague of the director of this observatory from 1921 to 1951, professor of astronomy at Harvard University (1921-1956), and member of the US National Academy of Sciences H. Shapley, B. Herasymovych was actively bringing domestic astronomy and cosmology onto the international stage – something that Stalinism halted for nearly a quarter-century. The sudden descent of the "Iron Curtain" and the beginnings of the "Cold War" and "arms race" between the USSR and the USA in the mid-1940s placed the systemic interaction between Soviet and world science in the context of irreconcilable geopolitical opposition between the Eastern and Western military-political blocs. Yet, the dawn of the Space Age, which gave rise to the superpowers' vast competition in the aerospace field, paradoxically brought their scientists closer together on the strange path to an unusual rivalry-collaboration. This, in fact, began with the flight of "Vostok-1" on April 12, 1961, as conventional marker of the dawn of a new epoch of cosmological research and the dissemination of knowledge about it in the Ukrainian SSR and around the world.

Alongside the popular science works by S. Vsekhsviatskyi, V. Tsesevych and their colleagues from the 1960s-70s, which show a shift in focus toward a more critical yet deeper study of the current achievements of foreign astronomy then, dozens of impressively designed

Ukrainian-language publications for children and youth also appeared in the Ukrainian SSR. In addition to the highly informative illustrated digest in the format of a puzzle book on the history and theory of astronomy and cosmology for the inquisitive, “Astro-Cosmic Mind Teasers” (1967) by I. Marchenko, “Veselka” published in the same year the books “In the Land of the Invisible” by O. Averbukh and “The Giant Ray” by H. Karpenko. O. Averbukh devoted special attention to the radio physics studies of the Solar System by Soviet academic science, such as the “window to the Universe” – the radio telescope – and the prospects of space radio communications. He developed this theme further in the book “Mysteries are On the Horizon” (1970) in the format of an intriguing “story about the ‘white spots’ in science with a prologue and epilogue,” including materials from the selenophysical research of American astronauts. In two interviews in the sixth chapter, “The Moon from Afar and Up Close,” with the director of the Main Astronomical Observatory of the Academy of Sciences of the Ukrainian SSR, corresponding member of the Academy of Sciences of the Ukrainian SSR Ye. Fedorov, he highlighted the contributions of domestic astrophysicists M. Barabashov, Yu. Kondratyuk, & A. Yakovkin, as well as their younger colleagues I. Havrylov and I. Koval, to the academic study of the Moon in Ukraine. Let us also recall a number of other equally interesting and informative works on space exploration published at that time by both “Veselka” and “Molod,” for example (Rozenblitt, 1961; Zemlyak, 1968). In fact, the author of the first of these – “Man Steps into the Universe” – was the first in the aforementioned list of popular works to respond to the “star hour” of humanity, marked by the flight of “Vostok 1” in April 1961, in the context of an in-depth analysis of the historical journey from aeronautics to astronautics. Referring to the bibliographic indexes of these publishers for the 20th century and, above all, “Veselka – for Children: 1934-1984” (1985), reaffirms the conviction of the authors of this article that the 1960s unveiled a qualitatively & quantitatively new – postmodern – stage in the progress of our astronomy and cosmology, and accordingly, in the field of their promotion in print in Ukraine.

This controversial intersection of Khrushchev’s “Thaw” and the “stagnation” period in the history of the Ukrainian SSR manifested clear signs of a flourishing, albeit controlled and state-restrained, Russified and censored, but nonetheless scholarly renaissance in Ukraine. One such sign was the noticeable impact of native academic scholarship on the continuous revival of education in the post-Stalin era. It was just in the 1960s that an impressive series of innovative educational publications in Ukrainian appeared in the Ukrainian SSR: from “The History of the Development of the Concept of Number and Number Systems” (1963) by O. Borodin (in “Soviet School”) to “Bionics” (1967) by I. Litynetskyi (in “Technika”) and “Fundamentals of Genetics” (1968) by Ye. Holynska, published by the Kyiv Shevchenko State University Press. It was during this decade that an academic publishing boom focused on Ukrainian studies took place in the Ukrainian SSR, with the most notable being the publication of the “Ukrainian Soviet Encyclopedia: in 17 volumes” (1959–1965). Alongside this, “Naukova Dumka” published works such as “An Outline of the History of Philosophy in Ukraine” (1966), as well as the “History of Ukrainian Art: in 6 volumes” (1966–1968) and the “History of Ukrainian Literature: in 8 volumes” (1967–1971). Between 1971 and 1975, the Institute of Archaeology of the Academy of Sciences of the Ukrainian SSR released its “Archaeology of the Ukrainian SSR: in 3 volumes,” created at the start of the “stagnation” period. Despite censorship concerns, “Soviet School” published the “History of Ukrainian Culture. From the Most Ancient Times to the Mid-17th Century” (1961) by Professor M. Marchenko of Kyiv Shevchenko State University. Interestingly, the aforementioned domestic publishing houses for children and youth actively and systematically promoted alternative versions of world history by Ukrainian and foreign scholars throughout the 1960s–1980s. Notably, the “Veselka” publishing house played a leading

role in this process, which was far from spontaneous. Perhaps its best-known contribution to a critical reexamination of official historiography is a book conceived within the walls of Kyiv Shevchenko State University (Burganskyi & Furdui, 1988). Equally noteworthy are three books published by “Veselka”: “Riddles of History” (1966), “Ghost Hunters” (1968), and “Through the Darkness of the Ages. A Book of Hypotheses” (1969), by the Ukraine-born, renowned Orientalist O. Horbovskyi. In three chapters of the third book – “The Forgotten Path Across the Ocean,” “Was There a Global Catastrophe?” and “The World Before the Catastrophe” – he illuminates the concept of the existence of a pre-flood civilizations, employing as evidence in support of this theory “sacred” texts of the Abrahamic and other religions, as well as a broad range of little-known achievements in astronomy and cosmology.

No less provocative for academic historiography than the works of I. Velikovskiy, E. von Däniken, M. Cremo, Z. Sitchin, and other “alternative” scholars, this study nevertheless likely deciphers a mythical narrative common to many ancient cults – the story of a global catastrophe. The struggle between the “Serpent of the World Abyss” and the Sun for the Earth can be interpreted as confirmation of the concept of tectoorogeny, as justified by V. Bondarchuk, rector of Shevchenko Kyiv State University (1944 – 1951) and academician of the Academy of Sciences of the Ukrainian SSR. According to this concept, the “continuous water surface” of the Proto-Earth at the end of the pan-volcanic period was disturbed by underwater volcanoes, which served as the sources for the emergence of Earth’s continents from meteoritic materials (Bondarchuk, 1971). This teaching, with its idea of cosmic periods in Earth’s history and the evolution of its flora and fauna, determined by the progression of “galactic years,” is one of the main achievements of geomorphological and geochronological academic studies in the Ukrainian SSR during the second half of the 20th century – studies that were closely linked to cosmological research of that period. Their fruitful results became known to a wide domestic readership through an abundant list of popular science articles and books, such as (Otkalenko, 1974; Utkin, 1983; Yurkivskyi, 1988). The first of these works offers a detailed examination of all layers of the Earth’s geographic envelope against the background of its history in the context of the history of the Solar System and the Cosmos. The author of the third work revealed the foundations and evolution of theories about the shape of the Earth, with reference to a unified geodynamic theory of its formation. A particular highlight of this list is the elegantly designed album “Life of the Earth: An Essay on the Structure of the Earth and the Development of Life on It” (1983) by the somewhat forgotten staff member of the Central Scientific-Natural Museum of the Academy of Sciences of the Ukrainian SSR, V. Utkin. It is precisely in this, the most representative domestic academic popular science study of the 20th century on geochronology, that its author – a professional geologist and palaeontologist – provides a well-argued exposition of hypotheses regarding the origin of the Solar System and Earth, as well as their history, referring to a wide spectrum of classical and modern cosmological theories. The appearance in “Veselka” and other publishing houses of the Ukrainian SSR in the 1970s–1980s of this and similar works, which seriously challenged the entire official science of the USSR, was a consequence of the flourishing thematic & substantive synthesis – unprecedented until that time – of the entire range of post-classical academic humanities and natural sciences in the 1960s, especially astronomy, cosmology, philosophy, and, notably, physics.

The advancement of fundamental and applied research in physics at the Academy of Sciences of the Ukrainian SSR was notably sustained in the two aforementioned institutes of the academy – the Kharkiv Institute of Physics and Technology (since 1928) and the Institute of Physics (since 1929). It flourished at the Institute of Theoretical Physics of the Academy of Sciences of the Ukrainian SSR (since 1966), under the leadership of its first director,

academician of the Ukrainian SSR, N. Boholiubov. This progress was due, in particular, to close cooperation with the institutes of mathematics and cybernetics within the Academy, as well as the Institute of the History of Science and Technology. Among the achievements of their collaborative work are the authoritative “Encyclopaedia of Cybernetics: in 2 volumes” (1973) and “History of National Mathematics: in 4 volumes” (1967-1970), as well as the known candidate thesis defended in the Ukrainian SSR, “History of the Development of Nuclear Research in Ukraine” (1974) by A. Trofimenko. The writing of all these works in the 1960s and early 1970s at these institutions coincided with an extremely significant event in the revolution of Ukrainian and world physics: the hosting in the capital of the Ukrainian SSR Kyiv in late August – September 1970 of the 15th International Conference on High Energy Physics, known as the Rochester “Olympiad of Physicists.” A decade earlier, in 1959, Kyiv had already warmly welcomed participants of the 9th Rochester conference – the first city in the USSR to do so after Rochester (the USA) and Geneva. The ninth conference, specifically Kyiv, which, unlike the fifteenth, did not leave a loud mark in the Ukrainian SSR information space, became one of the most significant international impulses for the rapid development of national and global theoretical physics in the second half of the 20th century. However already the 15th Rochester, convened in Kyiv on the eve of the celebrations both in the Ukrainian SSR and in the USSR as a whole – namely, the 100th anniversary of the birth of V. Lenin (1970) and the 50th anniversary of the founding of the USSR (1971) – was meticulously covered in Ukrainian in a monograph published by “Naukova Dumka” (Shelest & Rozhen, 1970). The authors were Vitaly Shelest, deputy to N. Boholiubov in his role as director of the institute for scientific work in 1966-1974, corresponding member of the Academy of Sciences of the Ukrainian SSR, and Olexander Rozhen, a graduate of the Department of Radiophysics of Kyiv Shevchenko State University, who at the time was editor and scriptwriter at the “Kyivnaukfilm” studio.

They explored the difficulties facing modern science in the context of an analysis of current issues in classical and modern cosmology, explaining throughout five chapters – particularly in the first two, “The Difficult Search for the Building Blocks of the Universe” and “The Forces That Govern Particles and Worlds” – the essence of the achievements of scientists from the Academy of Sciences of the Ukrainian SSR and worldwide in uncovering the secrets of the micro- and submicroworld. On the eve of the discovery of quarks, the largest delegations at this gathering – each with 300 participants from the USA and the USSR, 120 from West Germany, and 80 from the United Kingdom, including the authors of this work and the founder of the Rochester Conference, R. Marshak from the USA – attested to “the rather striking diversity of the physical picture of the world” (Shelest & Rozhen, 1970: 54). Their observation that theoretical physics significantly lags behind experimental physics, and that all discussions, as noted at the time by Professor A. Lubchenko of the Department of Physics of Kyiv Shevchenko State University, revolved around quantum field theory, was reflected in a series of notable, highly erudite, and broad-minded studies by Ukrainian SSR scientists of the 1960s–1980s, especially (Davydov, 1972; Akhiezer, 1973; Khramov, 1983). The first of the three, Academician O. Davydov of the Ukrainian SSR Academy of Sciences, was praised by R. Marshak and V. Shelest as a great theorist. In his article for the well-known annual “Science and Culture: Ukraine,” published after the same conference, he presented a range of “newest ideas” about “the structure of the nucleus,” with a focus on the mystery of “quarks” (Davydov, 1972: 76–77). In the book published by “Naukova Dumka” under the topical title – considering the “pressing challenges” of the 15th Rochester – “The Evolution of the Physical Picture of the World” (1973), O. Akhiezer creatively developed the hypotheses proposed by the conference delegates. He later reflected on them in his monographs “Fields and Fundamental Interactions”

(1986) and “From Light Quanta to Coloured Quarks” (1993). He came to the conclusion that the progress of “fundamental physical ideas” over the previous 300 years had shown the “non-elementarity of elementary particles,” which had previously been thought of as the “building blocks of the Universe” (Akhiezer, 1973: 81-83). This pin was based on his then more than 30 years of research in quantum electrodynamics, nuclear theory, and collective oscillations in plasma, which were acknowledged in the world science through “Quantum Electrodynamics” (New York, 1965), “Collective Oscillations in Plasma” (Oxford, 1967), etc.

Along with this and many other publications that the Editorial Board of Popular Science Literature of the Academy of Sciences of the Ukrainian SSR approved for publication in “Naukova Dumka” and other Ukrainian publishing houses, unique authorial studies and reference works that combined new knowledge about the mysteries of the micro-world and the enigmas of the Universe were also published. Special attention should be given to the encyclopaedic works, both in scope and content, of one of the leading promoters of astronomy, cosmology, and physics in the Ukrainian SSR of the 1960s to 1980s – the chief editor and later director of “Naukova Dumka,” Doctor of Physical and Mathematical Sciences, Yu. Khramov. From 1960 to 1964, he worked for the Main Editorial Board of the Ukrainian Soviet Encyclopedia. He wrote books for “Radyanska Shkola” and “Tekhnika” in Kyiv that taught the Ukrainian public about the important events in the history of astronautics, cosmology, and physics (Khramov, 1972; Khramov, 1983). The first and second editions of the “Guide to Space” (1970, 1972) introduced readers to both the classics of space science and its new fields, such as nuclear astrophysics. For students in the Ukrainian SSR, these books were like the thread of Ariadne through the foggy maze of the Minotaur’s cosmic mysteries. By revealing over 230 entries from “Automatic Lunar Station” to “Nuclei of Galaxies” the “alphabet of space,” he wrapped it up with a “chronicle of space exploration,” which covered everything from the history of the Apollo 16 mission in 1972 to the earliest astronomical records, which date back to approximately 3000 BCE in Ancient Egypt, Babylon, and China. This work provided, for the first time in Ukrainian, a professional account of the history of American lunar expeditions and projects, from Project Mercury (1958–1963) to the Lunar Orbiter Program (1966–1967), despite nearly two-thirds of it being devoted to the history of the space rivalry between the USA and the USSR. Equally universal – though distinctly Eurocentric – is this author’s “Biography of Physics: A Chronological Reference” (1983). In it, he outlines three stages in the history of modern physics as classified by him: from the first set by the special theory of relativity (1905–1931) to the third, renowned for the discovery of the subnuclear level of matter (from 1955).

Taking into account the ideas of S. Hawking, R.H. Dicke, and R. Penrose and the experience of P. Dirac he clarified the paramount challenge of twentieth-century physics for the delegates of the 15th Rochester Conference: “...to create a unified theory of all the forces of nature, including gravitational, and on its basis develop a complete picture of the universe” (Khramov, 1983:54). The themes in these two works by Y. Khramov encapsulate the breadth of natural science topics present in the academic philosophy of the Ukrainian SSR then. The Ukrainian folkloric and professional dimensions of astronomical and cosmological thought, from the archaic era to the 20th century, were brought to the forefront in many of its publications from the 1960s to the 1980s, including M. Parniuk’s “Folk Omens and Predictions” (1975) and M. Popovych’s “The Worldview of the Ancient Slavs” (1985) as well as collective histories of our philosophy. A guiding landmark of comprehensive scientific and popularization work on the development of philosophical studies of nature was the fruitful activity of the Scientific Council of the Academy of Sciences of the Ukrainian SSR on the issue of “Philosophical Questions of Modern Natural Science.” One of the outcomes of the coordination of 11 scientific topics

at the Institute of Philosophy of the Academy of Sciences of the Ukrainian SSR and related universities in the 1970s was the seminar “Albert Einstein and his Role in the Development of 20th-Century Physics,” held in June 1979 in Kyiv at the Institute of Theoretical Physics of the Academy of Sciences of the Ukrainian SSR. Academician O. Davidov, then director of the first of these institutes, opened the event by emphasizing that the development of ideas and categories of nonlinear quantum theory is one of the most fruitful paths to aware the complex connections between the micro-, macro-, and megaworlds. M. Omelyanovsky, the first director of the Institute of Philosophy of the same Academy, author of the works “Philosophy and Modern Physics” (1954) and “Philosophical Questions of Quantum Mechanics” (1956), aptly outlined the striking extremes of scientific cognition in the Cosmic Era: “The subtlest electromagnetic phenomena, the atomic and subatomic worlds, the grand phenomena on the scale of galaxies – these are the objects of non-classical physics ... Modern astronomy has discovered galactic nuclei, quasars, and other cosmic objects unknown to classical natural science, the physical understanding of which, possibly, goes far beyond the boundaries of existing theories” (Omelyanovsky, 1970: 4).

An important aspect of this second, academically and university-based phase of promoting philosophical and cosmological knowledge in the Ukrainian SSR is the broad range of studies conducted by the Institute of Philosophy of the Academy of Sciences of the Ukrainian SSR during the 1970s and early 1980s. This includes articles, reviews, and reports on various academic seminars and conferences in “Philosophical Thought,” as well as individual and collective monographs by scholars from this institute and Ukrainian universities. The international recognition of certain academic anniversaries in the early 1970s prompted a series of articles published in this journal over four years, reflecting the considerable attention the philosophical community of the Ukrainian SSR paid to the philosophy of cosmology. These included, above all, anniversaries celebrated in the USSR in 1970: the 150th anniversary of the birth of F. Engels and the 100th anniversary of V. Lenin. Of particular focus, however, were the 400th anniversary of the birth of J. Kepler (1971), the 250th anniversary of the birth of H. Skovoroda (1972) and the 500th anniversary of the birth of N. Copernicus (1973). Let us recall the articles published in “Philosophical Thought” by the Dean of the Philosophy Faculty at Kyiv Shevchenko State University (Dyshlevyi, 1973) and his colleagues from that and other universities (Kedrovsky, 1971; Fedchenko, 1975). These works were devoted to both classical and modern worldviews, in light of the ideas of N. Copernicus and J. Kepler, and to the exciting analysis of cosmological models considering the natural science studies of the classics of Marxism. The journal’s pages also noted the first two All-Union Symposia on philosophical difficulties of relativistic physics, which were held in Kyiv in 1965 and 1968, as well as the third, which was held in Kyiv in 1970 (Lukianets, 1970). The work of its Section 3 on “philosophical problems of relativistic cosmology” was thoroughly discussed, as were the presentations of Academicians of the Academy of Sciences of the Ukrainian SSR O. Akhiezer and M. Omelyanovsky, as well as Doctors of Philosophical Sciences M. Vilnitsky, P. Dyshlevyi, and M. Popovych. Usually, based on the materials of all these symposia in the capital of the Ukrainian SSR, collective monographs were published, including “Space and Time in Modern Physics” (1968) and “Epistemological Aspects of Measurements” (1968). In February 1973, an academic conference was also held in Kyiv in honour of the anniversary of Copernicus, with the active participation, together with their philosopher colleagues, of the director of the Main Astronomical Observatory of the Academy, Academician Y. Fedorov, and the oft-mentioned S. Vsekhsviatskyi.

These scholars based their work on the analysis of the principles of modern and postmodern philosophy of cosmology, such as the ideas of A. Fridman, the creator of the theory of a non-stationary universe, and the entire spectrum of his foreign colleagues. They also considered the inspired innovations of V. Ginzburg, the famous creator of the theories of superconductivity and superfluidity, as well as G. Naan, who proposed the hypothesis of a symmetric Universe, and I. Shklovsky, author of the work “Universe, Life, Intelligence” (1962), developer of the theory of the solar corona and its radio emission, corresponding member of the USSR Academy of Sciences and native of Hlukhiv. By combining the millennia-long experience of world cosmology with its most modern achievements at the time, the aforementioned scholars – such as M. Vilnitsky – aligned their study of the mysteries of the starry sky, the Solar System, and the Universe as a whole with a thorough consideration of the rich scientific legacy of the founders of atomic physics: M. Planck, A. Einstein, N. Bohr, W. Heisenberg, and others. Relevant to the global scientific community in the atomic – and by then already cosmic – age, these studies, not by accident, became one of the leading and consistent natural-scientific themes of the creative exploration by scholars of the Institute of Philosophy of the Academy of Sciences of the Ukrainian SSR and their university colleagues, both in the pages of “Philosophical Thought” in the 1970s-1980s and in numerous individual and collective works. They widely drew on both original publications and, primarily, Russian-language translations of the works of the classics of non-classical science, along with a diverse array of books by their advocates and critics, for example, Lincoln Barnett’s “The Universe and Dr. Einstein” (1948) and Herbert Dingle’s “The Special Theory of Relativity” (1952). M. Vilnitsky and his colleagues K. Bobrova, Y. Grabovsky, V. Melnikov, V. Kuznetsov, etc. present a broad spectrum of relevant and controversial topics in the philosophical study of elementary particle physics. An example of such an analysis is found in the article (Svyrydenko, 1985), devoted to the 100th anniversary of the birth of N. Bohr, “the great transformer of natural science,” and his debate with A. Einstein as “an extraordinary phenomenon of contemporary scientific culture.”

One of the most prominent achievements in the research and popularization of the philosophy of cosmology in the Ukrainian SSR during the 1970s – 1980s – from the height of the “stagnation” period to the end of Gorbachev’s “perestroika” and the collapse of the USSR – was the scientific activity of the eminent scholar, deputy director for scientific work at the observatory of Lviv State University, head of the Department of Religious Studies at the Vasyl Stefanyk Precarpathian National University, academician I. Klymyshyn. He authored the most renowned collection of works covering virtually every aspect of the study of the evolution of the starry sky: from “Astronomy Yesterday and Today” (1976), “Astronomy of Our Days” (1976), and “The Sky of Our Planet” (1979) to “Essays on the History of Astronomy” (1987), published by “Soviet School” in Ukrainian, and the world-famous monograph “Calendar and Chronology” (1981, 1985, 1990), translated from Ukrainian and republished three times by “Nauka” in Moscow. Beginning and ending these “Essays” with B. Pascal’s reflection on the wonder not that the Universe is infinite, but that the human mind is capable of comprehending its mysteries, I. Klymyshyn actively involved in this and other works a vast array of papers by world-renowned scholars, including many founders of relativistic astronomy. In “Pearls of the Starry Sky” (1981), he meticulously explained the “ABCs of astrognosiya” across the entire expanse of the starry sky of ancient mythology; at the same time, he thoroughly discussed in the first of the seven chapters of “Relativistic Astronomy” (1983) the “drama of classical cosmology.” In this work, I. Klymyshyn examined the philosophical side of the “mysteries of space-time” as well as the physical side of cosmology, moving from an analysis of Einstein’s “fundamental equations” and the “four-dimensional world of Minkowski” to the

mysteries of “black holes” and the difficulties of relativistic models of the Universe. These and numerous other works enumerate and elaborate on the history of cosmology, placing it within the centuries-old experience of the “stellar” development of calendars and chronology systems from Mesopotamia to now. His and his colleagues’ legacy is a clear confirmation of our major thesis: “The philosophy of cosmology is one of the key trends of the development of global philosophical thought in the 21st century, the age of the planetary establishment of the information network society, under the circumstances of its embracement of global environmental, social, educational, and other challenges” (Vdovychenko & Pohorilyi, 2025: 134).

Conclusions

The encouragement of the National Academy of Sciences of Ukraine and native university science to uphold their distinguished traditions and promote their continuity is a significant aspect of the post-World War II rise of cosmological studies in the Ukrainian SSR and the successful post-Stalinist development of domestic philosophical and cosmological thought. The voices of hundreds of items in traditional and contemporary academic scientific periodicals, especially the National Academy of Sciences of Ukraine’s journal “Space Science and Technology” (since 1995), which is the successor to the said Academy’s journals “Space Research in Ukraine” (1973 – 1984) and “Space Science and Technique” (1986 – 1992), provide a striking example of this. Both of them, as well as “Ukrainian Journal of Physics” (since 1956) of the Department of Physics and Astronomy of the National Academy of Sciences of Ukraine, and a lot of domestic publications, demonstrate the authors’ engagement with fascinating pages of the study of the microcosm and the Universe in the Ukrainian SSR and the world from antiquity to the present. These include nice celebratory essays honouring the anniversaries of the aforementioned scientists, as well as farewell tributes, such as the obituary (Galkina et al., 2023) in memory of professor at Kyiv Shevchenko State University and corresponding member of the said Academy E. Pashytskyi. There are also articles celebrating their predecessors’ contributions in the 19th century, such as the one (Strikha, 2024) by a graduate and lecturer of the same institution – former deputy head of the Ministry of Education and Science of Ukraine, Doctor of Physical and Mathematical Sciences, and translator M. Strikha. In this paper, he examined the vicissitudes of establishing Ukrainian-language physics terminology in the Taras Shevchenko Scientific Society in Lviv. Considerable interest among readers of the first of the aforementioned publications is also drawn to works on the history of aerospace research in the Ukrainian SSR and now independent Ukraine, such as the article (Lyalko et al., 2022). It dedicated to the 30th anniversary of the activities of the Scientific Center for Aerospace Research at the Institute of Geological Sciences of the said Academy. O. Konovalenko, a known current academician of the National Academy of Sciences of Ukraine, and several of his colleagues – also recipients of state prizes for science and technology, like those named after S. Braude and M. Yangel – have also items for these and several other reputable international scientific journals, including “Planetary and Space Science,” “Solar Physics,” “Monthly Notices of the Royal Astronomical Society,” and others.

Special attention should be given to Ukraine’s oldest science popularization and literary-artistic monthly, “Science and Society” (1923), which was published under the names “Knowledge” (1923–1951) and “Science and Life” (1951–1965). It operated as a serial closely connected to the Academy of Sciences of the Ukrainian SSR and the Knowledge Society of the Ukrainian SSR. The Ukrainian Centre for Spiritual Culture, which publishes it today, upholds the scientific traditions of its internationally recognized writers across multiple generations. Among them was K. Churyumov, a corresponding member of the aforementioned Academy, a

former director of the Kyiv Planetarium, a former leader of the Ukrainian Society of Amateur Astronomers, and the editor-in-chief of the popular science magazine “Our Sky” from 2006 to 2009. “Science and Society” has published works by a distinguished range of well-known cosmological philosophers and advocates over the past century, including O. Yemchenko, the head of one of its departments and the author of “The Pyramid of the Sun” (1991) and “The Magic of the Celestial Spheres” (1993). He was perhaps the first researcher in independent Ukraine to study the life and career of M. Nostradamus and also wrote an astrology column for one of the oldest science popularization and literary-artistic magazines for young people, “Knowledge and Work” (since 1929), which has been published as “Science Fiction” since 1991. The founders of the Main Astronomical Observatory of the National Academy of Sciences of Ukraine also made exceptional contributions to the dissemination of knowledge about the history and theory of the philosophy of cosmology in 20th-century Ukraine. These publications included the journals “Kinematics and Physics of Celestial Bodies” (since 1985) and “Space Science and Technology” (since 1995), as well as the annual “Astronomical Calendar” (since 1948). Since 2006, “Svitoglyad,” the popular science magazine of the Main Astronomical Observatory of the said Academy, has carried on and expanded their long-standing, traditional, yet inventive tradition. It has introduced a wide range of topics in the philosophy of cosmology to the scientific community and the general public over the last 20 years.

The Ukrainian philosophical community – primarily the ideological descendants of the “Kyiv Philosophical Circle” from the 1950s–1980s – is making a significant contribution to promoting philosophical and cosmological knowledge in independent Ukraine. The most notable of these is the International Society of Philosophy and Cosmology (ISPC), which has been led for many years by Dr. of Philosophy Oleg Bazaluk. He developed and refined the innovative scientific-philosophical model of the universe known as “Evolving Matter” and authored well-known monographs on the subject (Bazaluk, 2016). Alongside him and his colleagues – co-founders of Ukraine’s leading professional journal in philosophy and cosmology, “Philosophy and Cosmology” of ISPC – other prominent figures from Ukraine’s academic and university-based philosophical community, such as the authors of the article (Prits & Kuznetsov, 2020), also contribute noticeably to this field. The philosophical and cosmological views of the distinguished group of founders of the Kyiv School of Philosophy in the latter half of the 20th century, particularly the book “Scientific Truth and the Role of the Scientist. Copernicus. Bruno. Galileo” (1984) by V. Azarkhin and V. Horsky, served as one of the explicit sources of their interest in this topic. One noteworthy outcome of the ongoing in-depth research in this and other works, like the 1972 monograph “Yuri Drohobych” by Ya. Isaevych, a well-known Ukrainian medievalist, became a thorough popular science project (Ukrainian Sky, 2014). It focused on the contributions of our scholars from the Middle Ages and Early Modern era to the growth of global cosmological thought. This project was published under the auspices of the Y. Pidstryhach Institute for Applied Problems of Mechanics and Mathematics of the National Academy of Sciences of Ukraine. No less thorough attention to this topic has been given by a quantity of the over 100 scholars from this and other institutes of this Academy, who have covered in detail all stages of the national philosophy of cosmology from its archaic origins to the present in the first academic, multi-volume Ukrainian-language edition “History of Ukrainian Culture: in 5 vols., 9 books” (2001 – 2013). Among them, notably, was I. Klymyshyn, along with his numerous colleagues and students.

In his current studies, I. Klymyshyn has creatively built upon the work of many scholars: including Yu. Khramov and his colleagues in physics, particularly the book “Problems of Relativistic Many-Body Dynamics and Nonlinear Field Theory” (1974) by V. Pysarenko, a

former researcher at the Institute of Physics and Institute of Mathematics of the Ukrainian SSR's Academy of Sciences, who holds a Doctor of Physical and Mathematical Sciences degree. He also draws from the work of fellow astronomers, such as the monographs "Einstein's Field Equations" (1962) and "Universal Gravitation" (1971) by O. Bogorodsky, the former director of the Kyiv Shevchenko State University Observatory. In our view, I. Klymyshyn's more than fifty years of scholarly work vividly illustrate the ongoing evolution of academic and university science in the Ukrainian SSR during the second half of the 20th century – from the Stalinist pseudo-scientific paradigm of a then "closed" society to its Europeanization and openness during "perestroika." In fact, this transition unmistakably set the path for positive changes in the study both Cosmos and the microworld in the Ukrainian SSR. Numerous other colleagues of I. Klymyshyn from the Academy of Sciences' Main Astronomical Observatory and other institutions, as well as from university observatories across Ukraine, also supported this path. Prominent scientists from the first of these institutions include its current director, Y. Yatskiv, and his colleague, astrophysicist L. Shulman. Memory of this Doctor of Physical and Mathematical Sciences, who was also a co-founder of the People's Movement of Ukraine and the first head of its Science Committee, has already been immortalized in the name of the planet. Generations of their students, including those at Taras Shevchenko National University of Kyiv, are carrying on the tradition of their scientific research and educational outreach today – despite the incredibly difficult circumstances of the Russian-Ukrainian war. These include A. Kasianchuk, a volunteer, a student at the university's Faculty of Physics, a First Category Engineer at the Laboratory of Physics of Small Bodies of the Solar System of the Main Astronomical Observatory of the National Academy of Sciences of Ukraine, a young researcher of L. Shulman's scientific career, and an online promoter of physics and astronomy (Kasianchuk & Reshetnyk, 2025). Notable is also his more senior and well-known colleague, Doctor of Physical and Mathematical Sciences S. Parnovsky, who was a former researcher at the university's observatory and is the author of this article (Parnovsky, 2022) and numerous other works on the history of cosmology. It is the diligent daily creative work of them, their thousands of colleagues – students, teachers, & scientists of independent Ukraine – that serves as the base for our nation's fundamental and applied scientific achievements and is confidently leading it to qualitatively new – supra-planetary, innovative frontiers.

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