THE POLYNON:
A GEOMETRY OF CONSCIOUSNESS

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Abstract This work presents a geometric framework for cognition, centered on a conceptual polytope, the Polynon, to explore consciousness and its relationship with physical reality. Adopting an analytic idealist view, the Polynon posits consciousness as the foundational element of existence, preceding physical phenomena. A polynonial mechanism is introduced, offering a geometric and ontological interpretation of consciousness, where both reality and the observer unfold as holographic projections. This framework maps consciousness by analyzing epistemological interactions among phenomena (sensory experience), phantasiai (internal representations), and noumena (underlying reality). Cognitive gravity and gradients provide metrics for cognitive dimensions, while a continuum of perceptual dimensions is proposed, with the wavefunction in superposition linking the observer's cognition to hidden physical realities. This model connects cognition to reality's structure, proposing a new mechanism for the observer's measurement.

Keywords Consciousness, Hologram, Cognitive Gravity, Noumena, Wavefunction, Observer, Reality

1 INTRODUCTION

Consciousness is one of the most intriguing subjects in human inquiry, defining our awareness of self, environment, and the dimensions of subjective experience. Its complexity makes it a focal point across disciplines: psychology views it as a spectrum of awareness, neuroscience as a byproduct of neural processes, and philosophy as an inquiry into the nature of mind and reality.

Historical discourse on consciousness spans from ancient philosophy to modern science. Mathematical and geometric cognitive models, rooted in geometric cognition, cognitive geometry, and neurogeometry, offer precise methodologies for studying cognitive effects of consciousness. These models translate complex concepts into visualizable, quantifiable forms, opening new avenues for exploration. Inspired by Gestalt psychology, geometric perception and cognition reveal universal laws governing cognitive processes, extending beyond the human condition and highlighting the limitations of human cognition. Recognizing these limitations, we accept that our understanding of reality is shaped by both cognitive capabilities and constraints, suggesting our models reflect structured interpretations rather than reality itself.

In this view, the polynon's geometric representations serve as a form of epistemic ontology, indicating that our cognitive models reflect not the world itself but our structured interpretation of it.

This emphasizes that our interaction with reality is mediated by cognitive structures, including perception, imagination, and noumenal

factors, suggesting a complex engagement with the world beyond mere reflection. Just as thoughts shape internal experiences into symbols and perceptual dimensions, the polynon provides a geometric framework for cognitive processes. This approach unfolds across infinite cognitive dimensions, utilizing phenomena *(p_+)*, phantasiai *(p_-)*, and noumena *(n)*.

The study of geometric cognition, cognitive geometry, and neurogeometry reveals how the mind constructs perceived reality within a geometric framework, enhancing our understanding of how cognitive landscapes and sensory experiences are shaped. While the polynon's transition from geometric data to experience requires further exploration, extensive qualitative research supports the concept of a geometry of mind, as envisioned by many others.

Hohol (2019, 2020) explores the origins of geometric cognition, highlighting innate visuospatial skills and the role of language and diagrams in abstract geometric thinking, beyond Greek mathematics. Geometric perception, rooted in Gestalt psychology, structures human interpretation of surroundings through geometric laws (Lappin, 1991; Metzger). Sarti and Citti (2019) argue that our brains are hardwired for geometric navigation. Spelke's research supports innate geometric cognition, showing that infants inherently grasp geometric properties, challenging the notion that geometry is solely learned. As she eloquently puts it:

> Geometry is not a cultural invention, but a universal mental construction.

The polynon acknowledges that human cognition is limited in fully perceiving things-in-themselves, highlighting that scientific theories are constrained by our sensory and cognitive boundaries. Gärdenfors (2004) explores these limitations through the "geometry of thought," where understanding is structured within geometrically arranged conceptual spaces. Concepts exist within defined geometric landscapes, such as color within a space defined by hue, saturation, and brightness. Lakoff (2003) argues that cognition is linked to bodily experience and shaped by metaphorical structures derived from physical interactions, supported

by neuroscience, which shows that perception and motor control are intertwined with conceptual understanding.

Lakoff extends this to cognitive geometry, suggesting that physical experiences influence abstract concepts through metaphor, shaping our understanding of time and emotions. This is central to the polynon, emphasizing the geometric nature of cognition and the role of metaphorical thinking in connecting physical experiences with cognitive processes.

> These forms represent the course of development of human consciousness from the animal basis, the pure sense-consciousness, to the spiritual or divine consciousness; both which extremes are not man — the one underlying, the other transcending the limits of human evolution.[1]

Various models and theories have been developed to map cognitive and geometric cognitive structures. Kuhn (2024) provides a comprehensive analysis of consciousness theories, many rooted in idealism and involving fundamental consciousness or meta-observers. The Polynon reflects on earlier models like Betts' (1887) evolutionary trajectory by proposing a geometric approach to consciousness. Here, the role of the Observer is central, acting as the focal point where the mind functions geometrically, shaping cognitive dimensions and the unfolding of consciousnes.

The role of the Observer is pivotal in multiple theories of consciousness and reality, taking on various forms and functions. In quantum theories, such as the Copenhagen Interpretation (Bohr, 1920s) and Transactional Interpretation (Cramer, 1986), the observer is crucial in collapsing the wavefunction, solidifying reality upon observation, though consciousness is not considered fundamental. Similarly, in Many Worlds (Everett, 1957), the observer's experience splits into different worlds, implying multiple realities coexisting without directly addressing consciousness as fundamental.

In Pilot Wave (Bohm, 1952), the observer reveals deterministic paths, viewing reality as deterministic and emergent, rather than

1 Louisa S. Cook (1887) Geometrical Psychology, or, The Science of Representation an Abstract of the Theories and Diagrams of B. W. Betts. G. Redway, London

consciousness-driven. Holonomic Brain Theory (Pribram, 1977) proposes that the brain processes information holographically, encoding and retrieving perceptions and memories through distributed wave interference patterns, emphasizing interconnectedness in cognitive functions. Orchestrated Objective Reduction (Penrose, Hameroff, 1996) suggests that the observer experiences reality as a result of a physical collapse, implying an objective reality independent of consciousness. Quantum Brain Theory (Anirban Bandyopadhyay, 2022) takes this further by suggesting that the observer's consciousness arises from polyatomic time crystals within microtubules, positioning consciousness as both fundamental and emergent from these intricate quantum structures within the brain. In QBism (Fuchs, 2010s), the observer is central to interpreting quantum events, making reality a personal construct tied to subjective experience.

In consciousness-centric models, the observer's consciousness is often seen as foundational. For instance, Analytic Idealism (Kastrup, 2018) posits that consciousness is the primary reality from which physical reality emerges, with the observer's consciousness creating a projection of reality. In CTMU (Langan, 2002), the observer is central to self-configuration and reality modeling, with consciousness as a self-configuring structure that underlies all of reality. Similarly, in Hoffman's Interface Theory (Hoffman, 2014), the observer perceives reality through a user interface that conceals deeper complexities, with consciousness playing a fundamental role in masking the true nature of reality.

Theories like Panpsychism (Whitehead, 1929; Chalmers, 1996) extend the notion of consciousness as ubiquitous, where it is considered fundamental and infuses all of reality, though the observer's specific role is less distinct. In IIT (Tononi, 2008), consciousness is defined by the capacity to integrate information, making it a fundamental aspect of reality, even as the observer's role is more about information processing than active reality construction. Attention Schema Theory (Graziano, 2013) posits that the observer constructs an internal model of attention that guides consciousness, implying that reality is shaped by how attention is managed, though consciousness itself is not deemed fundamental.

In theories like Active Inference (Friston, 2010s), the observer actively infers and updates beliefs to minimize prediction error, making reality a continuously updated model shaped by cognitive processes, rather than consciousness being fundamental. Assembly Theory (Lee Cronin, 2020s) views reality through the complexity of assembled structures, where the observer sees these complexities as a measure of information, without attributing a fundamental role to consciousness. Loop Quantum Gravity (Rovelli, 1990s) suggests that space and time are emergent from quantum networks, with the observer playing a role in defining relational properties of these networks, though not fundamentally tied to consciousness.

Wolfram's Ruliad (Wolfram, 2020s) proposes a vast computational universe where the observer's perspective defines a slice of reality, emphasizing computational processes over consciousness. In E8 Theory (Lisi, 2007), reality is seen as a geometric structure rooted in the E8 Lie group, with the observer potentially interacting with this structure, but, again, without consciousness being a central or fundamental element.

In Geometric Unity (Weinstein, 2020), the observer is integral to a unified geometric framework, implying a deeper, unified structure where reality is seen as a geometric construct, the Observerse, with consciousness implied as part of this overarching geometric unity. Finally, in theories like the Nested Observer Window (NOW) model (Riddle, 2024), each observer's cognitive horizon defines their reality, suggesting nested realities that reflect the observer's perspective, though consciousness is implied rather than explicitly addressed as fundamental.

As we will see, the polynon's treatment of the Observer goes further by presenting it as a holographic construct within the layers of the proposed noumenal lenses. Here, the Observer's perceptual mechanisms define the holographic nature of reality, where the entire structure of perceived reality is shaped by its cognitive dimensions. In this framework, consciousness is its very foundation, emphasizing that reality itself is a construct defined by consciousness, which fundamentally shapes and manifests all experiences and phenomena.

2 THE POLYNON

A polynon is a conceptual geometric entity, a polytope of which vertices are non-events and its edges, holograms:

> *An entity* is a self-contained existence that has a distinct presence and objective or conceptual reality. In Kantian philosophy *a noumenon* is a posited object or an event that exists independently of human sense and/or perception. *The phenomenal* (p_+) is the dimension of physical. *The phantasiai* (p_-) is the dimension of the epiphenomenal, the mental. *The noumenal* is the fundamental existence. *Points* (p) are representations for perceptions, individual measurements, and the wavefunction collapse. *An event* (e) occurs when *an observer* (O) is measuring the collapse of the wavefunction. *Non-events* are both negative and positive noumena (n). All positive noumena (n_+) in a polynon are equal and identical. All are projected into *cognitive dimensions*.

A polynon contains all the holograms of that which can be projected as a polytope. A tetranon contains all the holograms of a tetrahedron. A hexanon contains all the holograms of a hexahedron. An octanon contains all the holograms of an octahedron. A dodecanon contains all the holograms of a dodecahedron. An icosanon contains all the holograms of an icosahedron. Special cases, defined as dinon, mononon, and nullanon, contain the holograms of simpler or degenerate forms of polytopes, with dinon corresponding to a 2-dimensional polygon, mononon to a 1-dimensional line segment, and nullanon to the null or empty set, representing a 0-dimensional point or the absence of a figure.

3 PHANTASIAI ET PHENOMENA

Phenomena *(p_+)* represent the direct, immediate experience of the world through our senses, capturing raw sensory data—like the sight of a vibrant sunset or the sound of rain tapping against a window—processed by our minds in real-time. This concept, rooted in the Greek “phainómenon,” reflects the illusory potential of sensory experiences, where appearances may diverge from true nature.

In contrast, phantasiai *(p)* encapsulate the epiphenomenal landscape of cognition, bridging sensory experiences with abstract thought. Derived from the Greek notion of "phantom" or "appearance," phantasiai are the mind's initial encounter with the external world, shaping our unique perceptual reality through the integration and reinterpretation of sensory information, memories, and imaginative constructs. Greek thought, particularly Stoicism, views *phantasiai* as mental impressions that mediate between sense perception and higher cognitive faculties. Stoics distinguished between appearances and truths, emphasizing *kataleptikê* phantasiai—clear impressions that provide a true grasp of phenomena. Scholars like González (2006), Alloa (2018), Lohmar (2010), O'Gorman (2005), Noel (1999), and Cohoe (2016) highlight phantasiai's role in practical reasoning and understanding. Cohoe further suggests that phantasiai are not always necessary for theoretical understanding.

This synthesis challenges the traditional dichotomy between imagination and perception, suggesting that our brain is constantly perceiving, whether engaging with the tangible reality outside or the intangible constructs of our inner world.

4 THE THINGS IN THEMSELVES

Noumenal factors *(n)* denote the underlying realities, or things-in-themselves, that influence our conscious experience yet remain beyond direct observation and comprehension. In the polynon, the delineation between "thing" and "non-thing" ontologies, as highlighted by Esfeld (2020), plays a crucial role in understanding the proposed framework. "Thing" ontologies describe entities with distinct, independent existence, while "non-thing" ontologies define entities by their relational effects, emphasizing the interconnectedness of cognitive processes and reality.

Miller (2008) adds depth to this by differentiating "things" from "objects," where objects, unlike things, lack mereological parts, challenging traditional classifications and enriching the ontological

landscape. Jantzen (2010) further examines these distinctions within Ontic Structural Realism, exposing tensions in contemporary ontology. Rescher (2005) and Al-Fedaghi (2023) revisit Kant's "things in themselves," exploring its relevance for descriptive ontology, while Fabri (2021) contrasts realism and constructivism, essential for grasping the complexity of cognitive and noumenal landscapes.

Together, these and multiple other arguments form a comprehensive ontological foundation for the polynon. They highlight the necessity of differentiating between types of entities and their modes of existence to develop a robust understanding of consciousness and reality.

> It is impossible to separate phenomenon from noumenon, knowledge of both being essential for a complete understanding of reality.

Kant's distinction between noumenon and phenomenon, central to his philosophy and reflected in the polynon, separates the "thing-in-itself" from sensory manifestations. Rescher (2005) and Georgeon (2015) deem noumena conceptually essential but epistemologically inaccessible, while Emundts (2010) examines the differentiation between inner and outer experiences. Comparative studies by Weed (2002), Simon (1972), and Marshall (2018) challenge these views, suggesting noumenal substances might indirectly manifest within phenomena.

Philosophers like Fichte (1889) and Hegel (1816) focus on the mind's role in reality construction, with Schopenhauer (1818/2020) highlighting the will as fundamental and Peirce (1878) linking cognition with tangible experiences, suggesting an interaction between perception and noumenal qualities. Berkeley's subjective idealism (1957) contends that existence relies on perception, challenging the idea of an independent reality.

In the early 20th century, Russell (1918) advances logical atomism, deconstructing reality into simpler facts and emphasizing the intricate ties between language, logic, and reality. Kastrup (2018) and Faggin (2024) reframe these ideas by placing consciousness at the core of

noumenal reality, with Kastrup arguing that consciousness embodies the noumenal and gives rise to the physical world through measurement.

Carr (2021) and Smolin (2018) similarly address the quantization of reality, positing that perceptions, though limited, are rooted in a deeper underlying reality. Their work bridges the abstract and empirical, highlighting the interconnectedness of perception and the universe's intrinsic nature, aiming to reconcile observation with fundamental existence.

Henri Bergson's critique of universal mathematics, which informs the polynon, emphasizes consciousness's depth beyond mathematical constructs, challenging the reduction of Platonic Forms to mere abstractions. After all, the term "mathematics" originates from the Greek word *máthēma*, meaning "that which is learned," derived from *mánthanein*, "to learn." This etymological root underscores the nature of mathematics as a learning tool—a means to interpret rather than embody reality.

The polynon balances analytic idealism with naturalistic perspectives, acknowledging reality's qualitative essence and the limitations of human cognition and empirical observation. It concedes that scientific theories, while useful, are constrained by sensory and cognitive capacities, recognizing that reality surpasses full comprehension.

Here, the concept of "function" bridges mathematical and ontological domains, structuring system interactions and reflecting entities' roles without constituting reality or subjective experience. While mathematical functions map inputs to outputs, ontologically, they denote an entity's "purpose," distinguishing models of cognitive processes from the lived experiences or qualia that embody the essence of experience.

This distinction parallels Schopenhauer's assertion that differentiation holds meaning only within time and space (1966), dissolving into unified reality beyond these dimensions. Thus, while the polynon models cognitive processes and qualia as distinct, it ultimately suggests an underlying oneness, a singular essence transcending sensory and cognitive boundaries.

5 NOUMENA, NON-NOMIC, NON-EVENT, NOVENT

Distinguishing between noumena, non-nomic, non-event, and novent is crucial for constructing a comprehensive polynonial model. Noumena question perception and cognition limits, non-nomic phenomena disrupt natural law predictability, non-events explore occurrences without conventional characteristics, and novents introduce non-sensorial, multi-dimensional interactions. These concepts encourage a nuanced exploration of the universe beyond empirical observation.

The nomic, characterized by observable realities governed by laws, is explored through both empirical and potential aspects, as discussed by Schäfer (2008), Vallentyne (2004), and Sider (2020), focusing on the influence of natural properties and the principles underlying nature's laws. Kuipers (2019) and Chen (2020) examine nomic truth approximation, addressing the challenges of vagueness and the limits of empirical progress within nomic theories. Conversely, the non-nomic domain pertains to phenomena outside regular patterns, highlighting unique events and the limitations of conventional laws.

This exploration, as shown in works by Facco (2020), Selak (1986), and Cicco (2014), explore the unconventional mental expressions, the ramifications of non-Euclidean geometry, and the metaphysical considerations of nonlocality, underscoring the complexity of phenomena that defy nomic categorization.

In physics, nomic laws like Newton's laws of motion and the laws of thermodynamics serve as universal principles predicting outcomes, highlighting the law-like structure of reality. These laws, representing "nomic" principles, are distinct from mere descriptions or generalizations. In contrast, "non-nomic" pertains to phenomena that defy universality, focusing on unique events or anomalies, emphasizing the limitations of empirical science in fully grasping reality's complexity.

Employing a via negativa approach, the polynon uses empirical evidence to demarcate the unknowable, facilitating a philosophical exploration into reality's essence. Thus, nomic laws delineate what noumena are not, leveraging empirical knowledge to infer the

characteristics of the non-physical indirectly, unveiling the nuances between the visible and the invisible, the quantifiable and the beyond-measure.

Non-events and novents explore occurrences and entities that defy conventional understanding. A non-event lacks typical event characteristics such as temporality, causality, and the capacity to effect change in the observable world. This concept opens discussions on causality, time, and the essence of phenomena manifesting through potentiality or absence. Buckminster Fuller's concept of the non-event continuum, termed "novent" (1979), describes finite yet non-sensorial interactions, akin to gravitational forces, existing within and beyond perceptual boundaries. Novents link empirical reality with abstract dimensions, influencing both phenomena and phantasiai (p_+ and p_-).

In the polynon, individual experiences are transitory points *(p)* within a perceptual continuum, highlighting "temporary foci" that engage with the essence and potential truths of reality. These foci represent momentary interactions with negative noumena *(n_-)*, influencing our subjective experience and collapsing noumena into a personal yet universally connected phenomenal perception. Positive noumena *(n_+)*, in contrast, signify absolute truths existing independently of subjective experiences.

6 PSYCHOPHYSICAL MONISM

The conceptual bridges between Kant's noumena, Leibniz's monads, and Spinoza's substance form a philosophical network exploring reality's underlying structure (Jauernig, 2021). Kant's noumena parallel Leibniz's monads, self-sufficient entities reflecting the universe, and Spinoza's singular substance, emphasizing omnicentric and monistic properties. Slowik (2016) and Melamed (2009, 2013) further explore the metaphysical continuity and divergence in space, time, and experience. This intersection of ancient philosophy with modern physics highlights the enduring relevance of noumena, monads, and substance in understanding reality.

Monism addresses the mind-body problem by proposing a single substance underlying both mental and physical phenomena. Materialistic monism explains consciousness through physical matter, while idealistic monism views the physical world as a manifestation of mental reality. Psychophysical or Neutral Monism, supported by Russell (1927) and Chalmers (1996), reconciles these views, positing both mental and physical properties as expressions of a single underlying reality, challenging the reduction of psychology to physics and acknowledging the subjectivity of qualia.

> If something out of nothing can appear, then nothing holds all that can dissapear.

The polynon, aligning with Neutral Monism, integrates physical (phenomenal) and mental (phantasiai) aspects as expressions of a deeper noumenal dimension. Its omnicentric view allows any point to serve as a perceptual center, offering unique perspectives on the whole. This mirrors Bohm's implicate order and the Hindu concept of Indra's net, where each element reflects the entire structure, emphasizing interconnectedness and wholeness. Similar to Wheeler's "one electron universe" postulate, the polynon suggests a universe woven from a singular essence, with each component providing partial insights into an intricate, holistic reality.

In the polynon, observation redefines entities and noumena as reflections of a singular entity, infinitely mirrored across time and space, highlighting consciousness's paradoxical aspects of eternal existence and nothingness.

This "nothingness" represents pure potentiality—a pre-geometric cognitive space that serves as the source for the positive geometry of spacetime. Here, all phenomena reside in a primal noumenal state (n_-) ready to emerge, embodying pure noumenal potential (n_+). Infinity, transcending conventional endlessness, symbolizes limitless possibilities, with each potential non-thing acting as an ontological monad, expanding with the observer's understanding and continually revealing new noumenal realities.

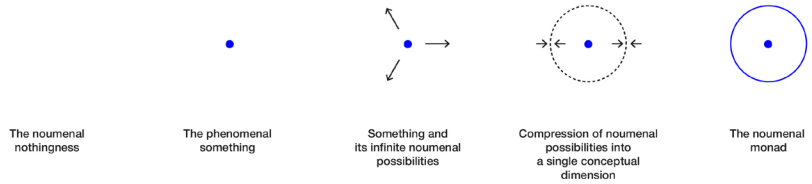

Fig. 1 The noumenal monad The noumenal potential collapses the noumenal realm into a single dimension, resulting in the conceptual noumenal monad, where the perceptual border is equal to the infinity of noumenal possibilities, as well as the phenomenal something.

The ontological monad, is used here as the embodiment of a visual and conceptual anchor for exploring dichotomies and paradoxes such as noumenon vs. phenomenon, thing vs. non-thing, and known vs. unknown. It transforms the conceptual boundary into a platform for self-reflection, where reflection transcends metaphor to become a literal mechanism of understanding.

In quantum mechanics, the wavefunction $|\psi(x)\rangle$ describes the probabilities of quantum states, indicating the likelihood of a "thing" being observed at a specific time and place. This concept presuposes that "nothingness" holds all potentialities, with varying probabilities across regions, and that observation collapses these potentials into actuality, defining reality by assigning perceptual dimensions.

The polynon extends this collapse concept from noumenal to phenomenal, enriching it with infinite dimensions and philosophical depth. It introduces a mechanism for a cascading effect of potentialities, mirroring Roger Penrose's visualization in "Shadows of the Mind" (1996), where an observer amidst infinite computation experiences a superposition of states, theory explored and tested by Neven et al (2024). This model suggests dimensions are dynamically influenced by observation, integrating the observer and observed into a unified framework that transcends conventional boundaries between dimensions and states of being.

> While we cannot have empirical knowledge of the noumenal self, we can have practical knowledge of it through the mechanisms of reflection and self-reflection.

Within the polynon, the act of self-observation initiates a feedback loop of continuous noumenal state collapse. This cognitive metacognition, where the observer is conscious of both the observed phenomena and its influence in observation, is encapsulated, here, in the formulation *f(f)=f*, akin to an Ouroboros mathematical formulation symbolizing a form of autopoiesis or self-production *ad infinitum*, a self-referential Fichtean process where the self *(I)* is both the creator and subject of its reality. Fichte's notion of self-positing and the iterative process of self-awareness shows how self-creation and reflection resonate with the principles of continuous self-regeneration and engagement with both internal and external dimensions. Perspective that embodied by the polynon's recursiveness, showing how self-creation and reflection resonate with principles of continuous self-regeneration and engagement with internal and external dimensions. In Wheeler's "participatory universe," the essence of phenomena hinges on observation, suggesting that the universe's reality crystallizes only upon being observed, argument necessary when considering the observer's role in shaping reality, where the act of observation transitions potentialities into defined phenomena. This process, deeply entwined with the concept of time, implies that observation's frequency can alter the perception of time, reflecting on the classical measurement act as a temporal gauge.

> Eternity isn't some later time. Eternity isn't even a long time. Eternity has nothing to do with time. Eternity is that dimension of here and now that all thinking in temporal terms cuts off.... the experience of eternity right here and now, in all things, ... is the function of life. (Joseph Campbell, *The Power of Myth with Bill Moyers*, PBS, 1988)

The equation *f=1/t* illustrates how a decreased frequency of observation can condense time perception, positing an infinite temporal expanse in the absence of observation, where traditional time flow is suspended, unfolding thus the noumenal dimension:

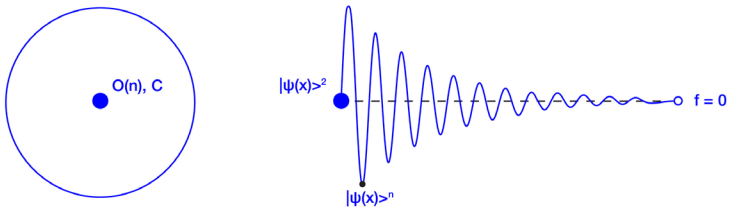

Fig. 2 The unplucked string of consciousness and its monadic projection

In the polynon, phenomena *(p+)*, phantasiai *(p-)*, and noumena *(n)* are entwined within the cognitive dimensions of an observer *O(n)*, challenging the notion that phenomena alone constitute fundamental reality. This perspective highlights the logical fallacy in physicalist assertions that prioritize the measurable over the experiential, denying the unknowable. Campbell's concept of eternity transcends temporal limitations, existing within the "here and now" as a dimension of consciousness integral to the observer's self-reflective function.

This eternal aspect of consciousness, a timeless monadic essence, is described as the perceptual continuum of *f=0*, signifying pure, timeless potential. The act of observation, akin to plucking this string, transforms potential into actual phenomena, reflecting consciousness's vibrations through reality, wavefunctions, and the infinite possibilities within it. The polynon's treatment of consciousness as Conscia Noumena, interwoven with psychophysical monism and the perceptual monad, posits consciousness as the primordial essence from which observable phenomena emerge.

This paradigm shifts the focus from attempting to quantify and measure to an understanding thorugh embodying the depth and richness of consciousness, by transcending the traditional dichotomy and perceptual fragmentation between the measurable and the experiential.

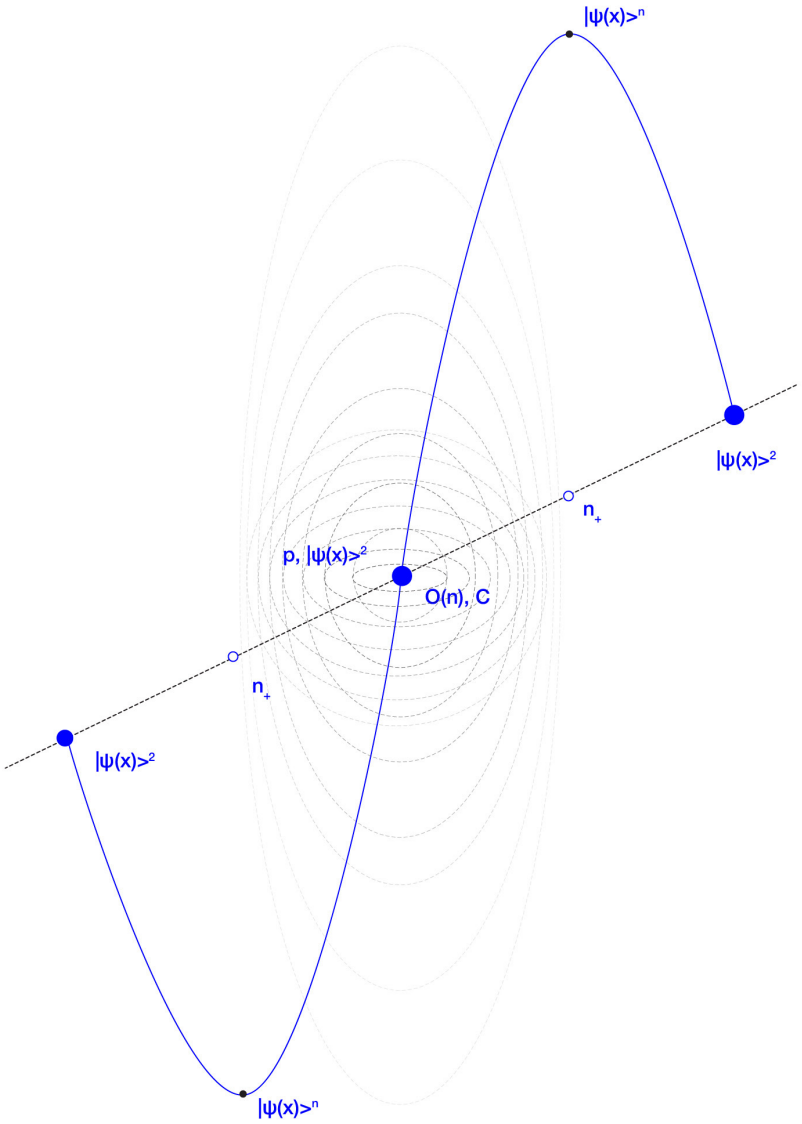

Fig. 3 The noumenal lens Each wavefunction is a layer of the noumenal lens, of which border is positive noumena *(n+)*, or consciousness *C*; it's contents are negative noumena *(n)* and it's holographic centre "collapsed" onto a phenomenal Observer *O(n)* as function of noumenal self-reflection of consciousness.

7 THE LENS-PRISM INTERPRETATION OF THE WAVEFUNCTION

Redefining observation and measurement within the polynon unfolds the Observer as a conduit between the noumenal self and the perceptual plane, interpreting the wavefunction through a lens that unfolds the cascading effects of noumenal collapse. The wavefunction transcends its conventional mathematical role within Hilbert space, embodying a physical attribute of the noumenal and facilitating various layers of reality's interpretation. In this context, $|\psi(x)\rangle^n$, with n not strictly equal to 2, diverges from standard quantum mechanics, suggesting that different values of n represent distinct dimensions or layers of noumenal collapse.

This conceptual extension posits that each layer of collapse, influenced by a unique exponent n, offers varied perspectives on noumenal reality, with n serving as a parameter that shapes the wavefunction's interpretative depth.

For $n=2$, the framework aligns with the traditional probability density interpretation of quantum mechanics, but for $n>2$, it signifies the enriched complexity and multiplicity of noumenal collapse into phenomena, defining the relation between cognitive processes and their manifestation on the perceptual plane. Through this mechanism, the polynon model bridges the gap between the noumenal essence and its phenomenological expression, offering a sophisticated exploration of consciousness and the fabric of reality.

This conceptualization envisions each layer of the noumenal lens as a distinct potential wavefunction, collectively shaping our perception of reality. Higher values of n suggest deeper layers of noumenal collapse, akin to going into more intricate dimensions of reality within the polynon. The exponent n thus acts as an exponent for interaction with varying causal structures within the polynon, with larger n values indicating engagement with more complex causal sets and noumenal dimensions.

The lens has a counter-intuitive approach to understanding the depth of it's noumenal aspects, higher values of n being closer to the absolute noumenal (n_+), with lower n values towards the core of

the noumenal lens (from n_+ to O_n): the noumenal border itself contains positive noumena, with $|\psi(x)>^n$ unfolding as negative noumena towards the focus center of the observer, where the classical collapse $|\psi(x)>^2$ takes place.

It is only at the point of observation or measurement that these possibilities converge into a singular, experienced phenomena. This convergence, or collapse, represents the moment when the boundless potential of the noumenal transmutes into the phenomenological world as perceived by the observer *O(n)*.

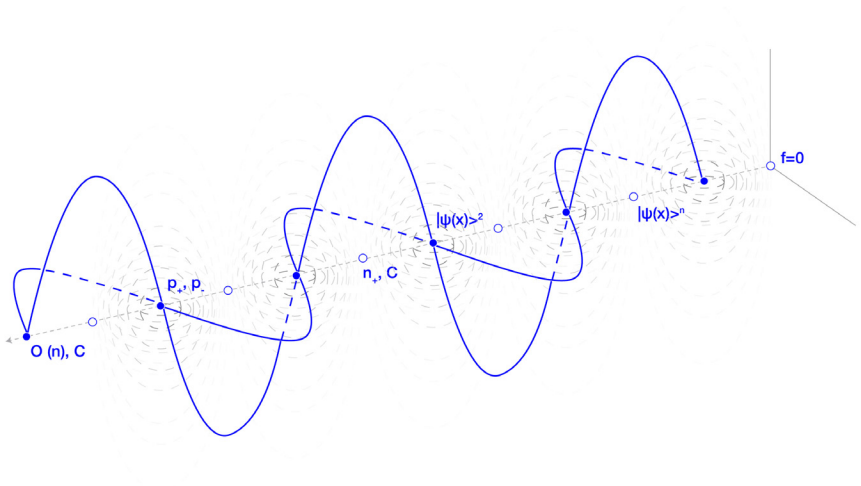

Fig. 4 The lens mechanism of the wavefunction Each layer of the lens is a wavefunction in itself, providing mechanism for the observer as function of noumenal reflection

Incorporating *n* as a 'revealed variable' aligns with Bohm's interpretation of quantum mechanics, suggesting that understanding *n* could yield deterministic predictions within a landscape of infinite potential and probability. Bohm's theory posits that hidden variables, when unveiled, reveal a deterministic layer beneath quantum randomness. Similarly, if the noumenal variable *n* is accurately identified, it could expose a deterministic structure

underlying the probabilistic nature of quantum events, reconciling indeterminacy with fundamental order. The structure of the lens in the polynon suggests that noumena "closer" to the observer's perceptual system are more likely to collapse into phenomena, with this "closeness" not bound by time or space.

Viewing n as part of Bohm's "implicate order" introduces it as an inherent quantum property that becomes explicit upon measurement. Bohm's concept posits that all elements in the universe are interconnected within a deeper, non-local reality, where n serves as a hidden, intrinsic quality that observation brings to light.

Thus, while perceptual processes in the polynon appear deterministic, governed by initial conditions and intrinsic structure, they also contain an indeterministic nature due to the fundamentally unknowable aspects of noumena. Cognitive outcomes, though traceable to specific conditions, embody a dual essence—deterministic yet indeterministic—highlighting the balance between order and chaos in consciousness and cognition.

The collapse of the wavefunction becomes an iterative process of phenomenal observations (p_+) and (p_-), influenced by the observer's properties and the medium through which observation occurs. This process illustrates how the sum of wavefunctions, serving as a diffractive lens, transmutes the noumenal into a spectrum of observable phenomena and phantasiai $(p_1(O_n), p_2(O_n), ..., p_n(O_n))$, each reflecting the same underlying noumenal reality.

8 THE OBSERVER

The Observer, in this construct, is envisioned as a holographic projection sitting at the core of the noumenal lens, emerging from the focus and diffraction of noumenal probabilities within the noumenal lens. This conceptualization likens the simplest form of an observer to a monad, a single phenomenal construct surrounded by its noumenal subtance, illustrating an infinite array of perceptual lenses in superposition, with the noumenal at their margins and the observer positioned at the

perceptual core. The intersection of noumenal probabilities with the observer's perceptual lens acts as a focusing mechanism, directing the collapse of the noumena into the observer's cognitive field.

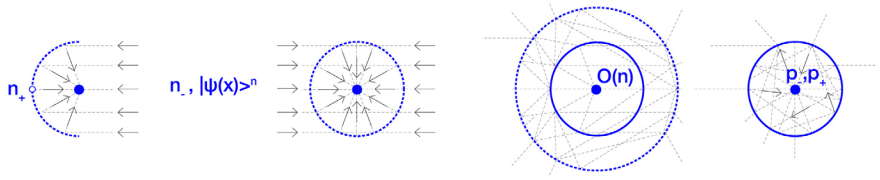

Fig. 5 The observer The perceptual border of positive noumena *(n+)* reflects and focuses probabilites *(n-)* into the hologram of the observer *O(n)*.

This process of focusing and diffraction amplifies the reflexivity between the observer and the observed, enhancing the observer's ability to perceive and interact with the noumenal dimension, only to reveal that there is no real distinction between them. As the number of noumenal collapses increases, the complexity and breadth of the observer's perceptual dimension diminishes, resulting in a progressive refinement and narrowing of perceptual prowess.

The observer's cognitive framework synthesizes a multidimensional mechanism, much like a holographic parabolic mirror capturing and projecting a three-dimensional image from scattered light sources. The lens acts as a diffractive medium for noumena while also serving as a focusing function, adjusting noumenal factors to create an observable construct, where each collapse contributes to a richer, more detailed representation of a phenomenal reality.

Yet, this narrowing of perceptual prowess does not signify a loss but rather the embodied *purpose* of self-reflection of consciousness: while the breadth of perception diminishes, the precision and clarity of the observer's interaction with phenomenal reality deepen. And, it is through the recursive focus between noumena and phenomena that the observer discovers the underlying unity of existence, where the distinctions between the observer and the observed dissolve, and reality itself emerges as a seamless continuum of consciousness and form.

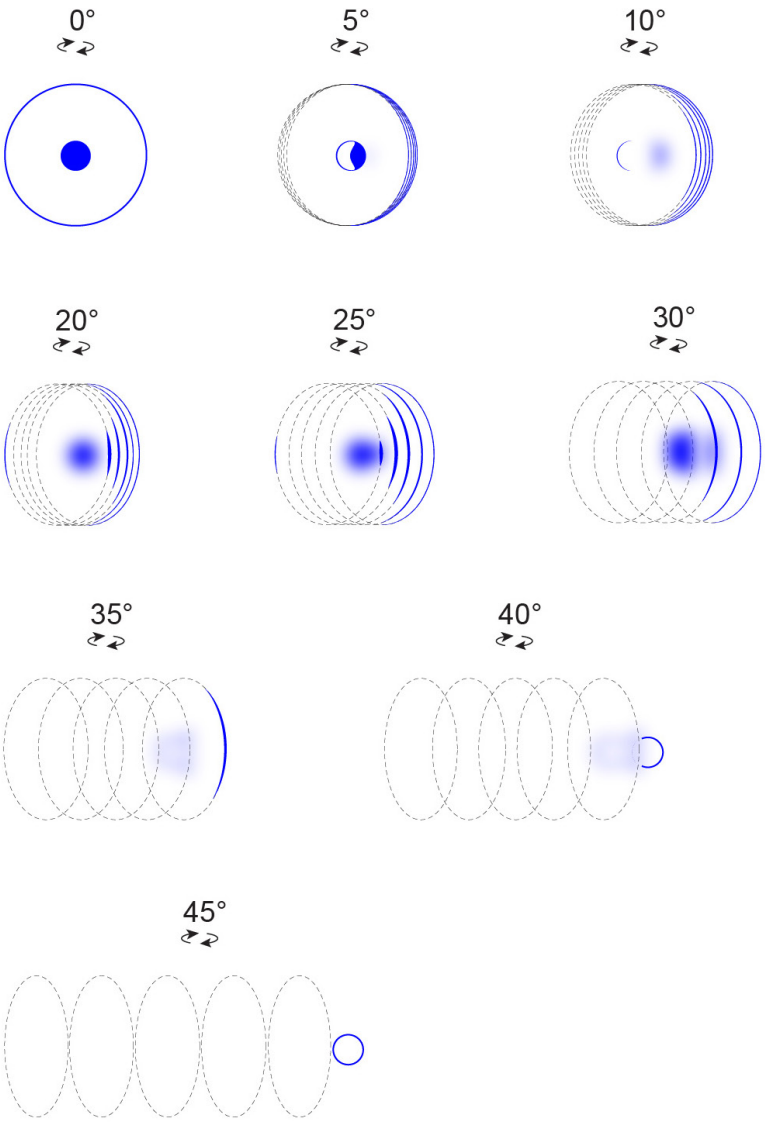

Fig. 6 Rotation of noumenal lens The revealing of the noumenal essence *(n_y)*, hidden under the superposition of the noumenal lenses *(n)* and the hologram of the Observer *O(n)*

The concept of a cognitive threshold marks the evolution from a purely phenomenal observer to one with phantasiai and higher-order cognitive functions. This threshold varies according to the local conditions of the observer's cognitive gradient and gravity and the overall noumenal function, defining a pivotal boundary within the cognitive landscape. Below this threshold, the observer is phenomenal in nature, processing phenomena without engaging in cognitive interpretation, acting as a conduit for sensory data rather than a reflective or interpretive entity.

While this definition includes basic perceptual mechanisms, it excludes complex processes such as phantasiai, proprioception, interoception, or self-awareness, emphasizing the absence of deeper cognitive and reflective capacities.

Above this threshold, the observer transitions into a state characterized by phantasiai—internal representations that bridge perceptual phenomena with abstract thought—and higher-order cognitive functions. These functions enable the observer to interact with and interpret noumenal signals, accessing deeper layers of reality through their cognitive capabilities. The more developed the phantasiai, the greater the observer's access to meta-cognition and noumenal functions, suggesting a metaphysical border at the threshold.

This integration underscores the continuity from basal to advanced cognition, emphasizing the evolving complexity of perceptual and cognitive processes. It also intersects with the Conceivability Argument (Chalmers, 2003), which posits that it is conceivable for a system to be physically identical to a conscious being while lacking specific conscious states. Such a system, mirroring the processes of consciousness below the cognitive threshold, could simulate the mechanics of awareness without the accompanying subjective experience.

This hypothesis underscores the possibility that physical identity does not necessarily entail conscious experience, providing a framework for exploring how cognition emerges from non-cognitive processes.

9 COGNITIVE GRAVITY AND GRADIENT

The observer's interaction with the noumenal and phenomenal is informed by their evolving knowledge and their evolving perceptual and cognitive dimensions, facilitated through their perceptual system. This ongoing update of understanding, underline the shift from physical system changes to changes in the observer's awareness during the measurement and observation process. Visualized with gravity's gradient *g(G)*, Cognitive Gravity *G* unfolds the noumenal lens and maps how certain noumenal aspects gain prominence or recede based on the properties of the noumenal lens. It anchors noumenal abstractions to perceptual experiences, paralleling the influence of physical gravity on human perception, motor control, and cognitive adaptation as explored, amonst others, by Pfeiffer (2016), Pozzo (1998), and Lakoff (2003).

Their work highlights how gravity shapes subjective experiences, balance, and motor skills, emphasizing the role of environmental forces on psychological and physiological processes. Other studies, such as those by Watson (1992) and Cohen (1992) on altered gravity environments reveal the brain's adaptability, while Monache (2021) and Beuzekom (2000) explore neural representations of gravity, showing how the brain integrates sensory input with gravitational knowledge for perception and motor planning.

In the polynon, Cognitive Gravity translates noumenal probabilities *P(n)* into concrete phenomena, acting as a cognitive filter influenced by cognitive mass—past experiences, biases, and focus—highlighting perception's selective nature. It elucidates causality by shaping causal patterns in perception and bridging potentialities with actualized experiences, shaping reality comprehension through cognitive adaptation. Cognitive gradients quantify "phentropy," measuring the dynamics of perception and the tendency of phenomena to become noumena. Akin to a cognitive entropy, it represents the degree of organization or complexity within perceptual processes, capturing the observer's ability to interpret, structure, or dissolve phenomena into deeper, often inaccessible, layers of noumenal existence. By

quantifying these dynamics, cognitive gradients provide a framework for understanding how perceptual experiences are shaped, evolve, and potentially transcend into abstract or unknowable realms, offering insight into the mechanisms that govern the continuity between sensory input and cognitive interpretation.

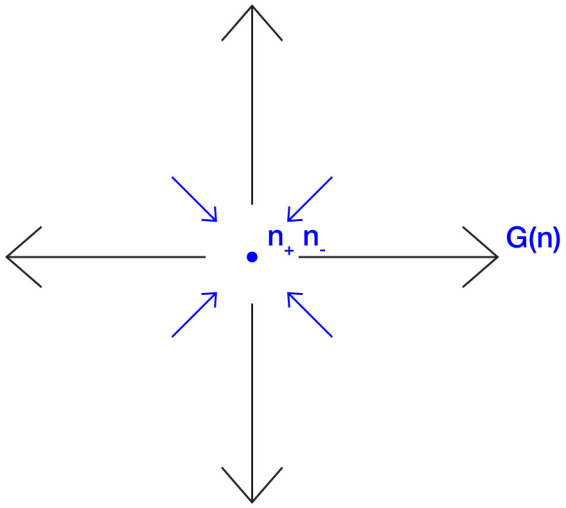

Fig. 7 Cognitive gravity and Causality The more Cognitive Gravity *G* in a polynon, the more causality

Cognitive gravity and gradient illustrate the transition from empirical knowledge to abstract understanding, paralleling the movement from observation to theory. Romero (2013) reinterprets space-time interactions within cognitive structures, exploring the concept of cognitive gravity. Kent (2024) further develops this by linking cognitive states to physical gravity, offering a contrast to the Polynon's idealistic framework. Additionally, Wen et al. (2013) and Sun and Wen (2016) contribute by providing data models that use gravity to map knowledge, extending the reach of understanding beyond purely empirical observations.

Epistemologically, cognitive gravity in the polynon highlights the limitations and biases in human knowledge acquisition, likening it to the gravitational pull that influences physical objects. This hidden mechanism directs our focus toward certain forms of knowledge, shaped by past experiences, cultural influences, and biases, spanning from empirical observations to abstract theories. The cognitive gradient *g(r)* captures this continuum, illustrating the challenges in understanding different epistemic domains.

Ontologically, Cognitive Gravity suggests that reality is deeply intertwined with our cognitive processes. The polynon proposes a multilayered reality, with dimensions ranging from sensory-informed perceptual reality to memory and imagination-shaped internal reality, and a noumenal reality beyond empirical observation, that map the mechanism of objective cognitive structures collapsing into subjective experiences.

9.1 THE NOUMENAL GRADIENT

The noumenal gradient *g(n)* delineates variances within noumena, independent of observers, capturing intrinsic complexities, abstraction levels, and potentialities within the unobserved strata of reality. It reflects the probability of noumena transitioning into phenomena, with the gradient's steepness indicating the abruptness of these changes. All noumena are seen as emanations from the singular positive noumenon (n_+), with *g(n)* measuring how negative noumena (n_-) diverge from this source.

Additionally, the noumenal gradient captures the subtle impact of noumenal factors on conscious experience, quantified by the proportionality constant α or "Noumenal Sensitivity," which measures a cognitive system's capacity to interact with these influences. This sensitivity dictates how systems adjust to emphasize critical inputs while filtering noise, defining the "volume" and "granularity" of perceived noumenal effects, thus optimizing cognitive resources within dynamic noumenal landscapes.

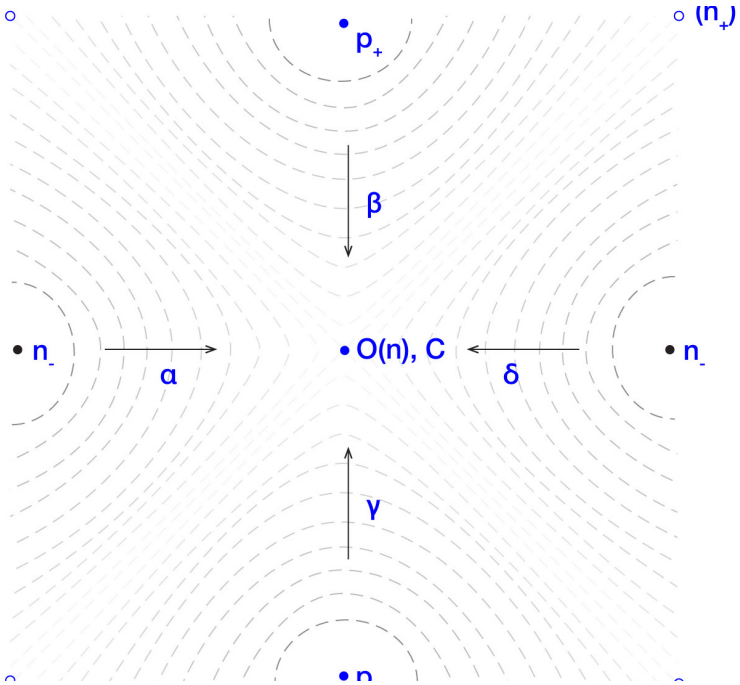

Fig. 8 Cognitive gravity and gradients The unfolded noumenal lens and its perceptual mechanisms mapped on cognitive and noumenal gradients.

9.2 THE COGNITIVE GRADIENT

The Cognitive Gradient *g(r)* delineates the intersection of the noumenal and phenomenal worlds through perception, reflecting spatial and cognitive processes within the observer's phenomenal perceptual plane. It indicates changes in perceptual clarity relative to the Observer *O(n)*, with a steep gradient suggesting significant shifts in salience and a gentle slope implying even resonance distribution.

This gradient acts as a prism for perception, sharpening focus on certain phantasiai and phenomenal aspects while obscuring others. At the null point, pure potentiality exists, representing pure conscious awareness and access to the noumenal. The interplay between noumenal and cognitive gradients is essential, as the former fuels cognitive experiences, while the latter brings the nuances of the phenomenal into the epiphenomenal.

Cognitive Variability γ contrasts with the physically grounded phenomenological bias β, embodying subjective biases and personal heuristics, and highlighting individual variability in collapsing the noumenal world. The distinction between $g(r)$ and γ is crucial: $g(r)$ maps potential cognitive functions, while γ quantifies the uniqueness of cognitive landscapes shaped by genetic, environmental, and experiential factors.

10 THE HOLOGRAM

The polynonial hologram proposes a leap in understanding reality and cognition, positing that multidimensional cognitive constructs are compactly represented within the edges of their geometrical structure. Like a hologram encoding three-dimensional information on a two-dimensional surface, the polynon allows the complexities of reality to be encoded and projected through the noumenal lenses. This holographic projection illustrates how reality is constructed by the noumenal through cognitive lenses shaped by cognitive gravity.

The observer's perceptual focus, directed through noumenal and cognitive gradients, refracts the essence of Consciousness, transforming noumenal vertices into discernible edges like light through a prism. This process establishes a cognitive horizon, demarcating the extents of the observer's comprehension.

Noumenal sensitivity α broadens this boundary by revealing deeper cognitive layers, while observational bias β filters reality through pre-existing knowledge. This horizon also acts as a reflective border, fostering self-awareness and introspection, transforming it from a boundary into an interface for dialogue between the observer and their self-reflection, bridging the self with the essence of existence.

This journey towards self-discovery and enlightenment transcends sensory experience, leading to a broader understanding of existence. The polynonial lens enables the convergence of multiple potential states into a singular, perceptible entity, with each vertex reflecting the entire polynon. This transition from individual vertices

to a unified whole illustrates how the polynon synthesizes disparate perceptions into a coherent construct, where each part mirrors and contains the blueprint of the entire structure.

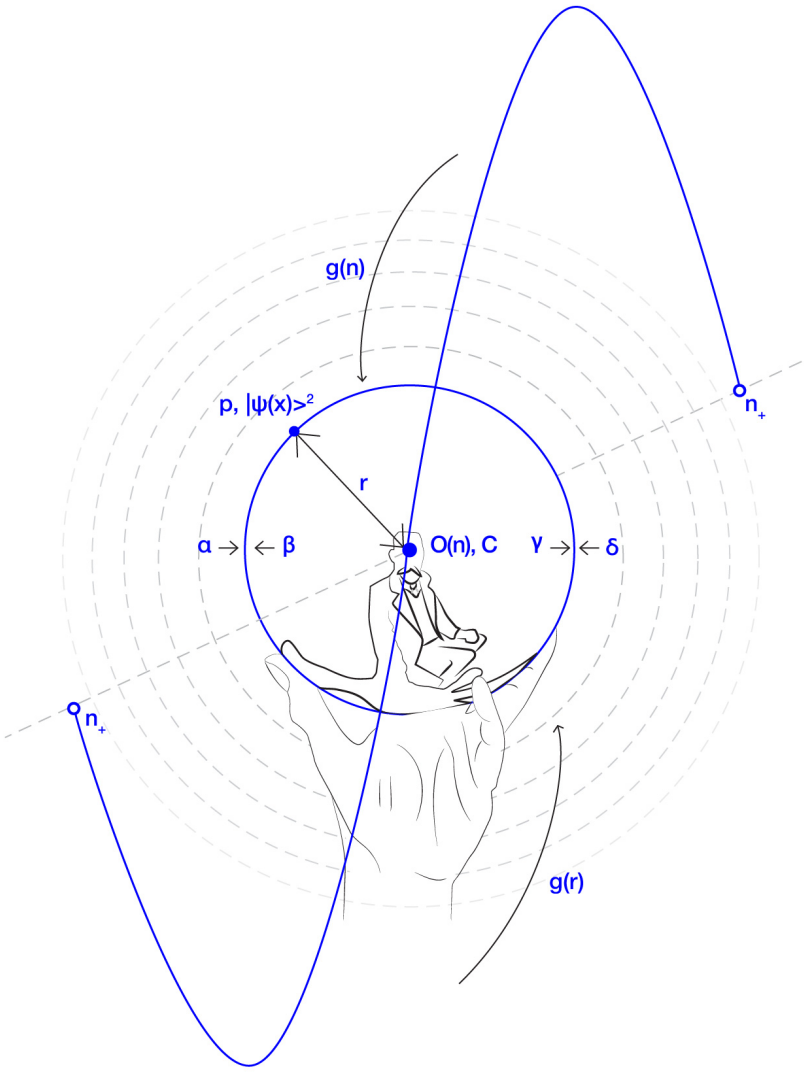

Fig. 9 Observer holding reflective sphere, after Escher Noumenal and cognitive factors mapped on the reflective surface of a sphere and the surrounding cognitive dimensions of the Observer *O(n)*

Thus, the hologram of a polynon enfolds within it the reflection of the noumenal substance, that both originates and reflects consciousness. It encapsulates the entirety of consciousness in each of its vertices and edges, as projections into a perceptual reality. The concept of "consciousness nodes" describes n_+ zones between noumenal lenses *(n)*, revealed as vertices of the polynon, equal and identical in nature.

Within the hologram, the wavefunction becomes an epistemological update, a transition from an epistemic idea to an ontological one (Kastrup, 2024), the edge of our epistemic lens. What we call 'collapse' is where our perceptual bandwidth gives way to probabilities that we can't directly perceive. Thus, our becoming is not just a transformation, but rather a transcendence, navigating metaphysical milestones that mark the dissolution of individuated parts into a unified whole.

> The polynon is abstract and elusive, residing beyond human imagination yet within its grasp. No heavier than a fleeting idea, but far too heavy to be understood. A palindrome for language and thought, mirroring itself in perpetual paradox. Beginning the same way it ends.

Once we understand that the description of the "thing" is only evidence of the "non-thing", we can trully start to grasp knowledge as is: paradoxical in nature, and consciousness reliant from the simplest perceptual mechanism to the multi-dimensional observer, of which both extremes are not human in nature. As such, the polynonial hologram provides a model for seeing knowledge as a non-linear construct between phenomena and noumena, between being and non-being.

The principles found in the paradoxes of primitive knowledge are bound to be entagled with those of human faculties, defining a loop between the known and unknown, between the self and the other. Balance of which observation tries to bring it to a still, an atemporal dimension that reveals all the polynonial elements as part of the same, fundamental substance.

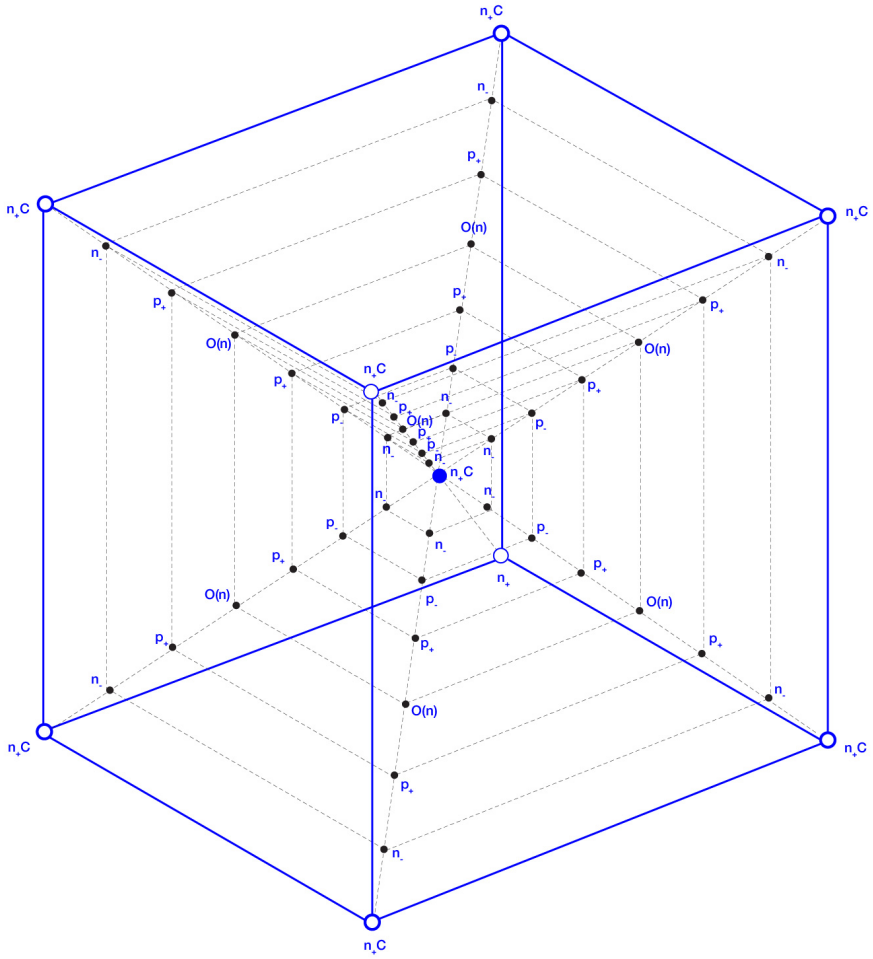

Fig. 10 Hexanon The Observer *O(n)* is in superposition with the phenomenal p_+, epiphenomenal p_-, negative noumena n_- and noumenal vertices n_+ of the hexanon as a function for self-reflection of consciousness *C*.

11 CONCLUSION

Historically, our quest to decipher the illusion of reality has predominantly followed a reductionist approach, seeking to distill the universe's complexities into more manageable, elementary components. This perspective, while undeniably valuable, has gradually solidified into a limiting belief system, portraying the universe as simply a clockwork assembly of atomic entities.

However, the insights gleaned from the constructs of the polynon, compels us to seek a more holistic understanding that appreciates the interconnectedness of all phenomena and phantasiai with the noumenal, property given by their inherent illusory potential.

While the proposed mechanism needs further exploration, the foundational geometric construct of the polynon proves invaluable in bridging the gap between abstract concepts and their phenomenal manifestations. By integrating methodologies and processes from various fields that share epistemological foundations with geometric cognition and cognitive geometry, the development of the polynon is being built upon a significant opportunity. Understanding the mechanisms of geometry—not solely from a mechanical perspective but also a conceptual one—facilitates a universal architecture and dialogue between things as we perceive them and the things-in-themsleves. However, further research is necessary to elucidate how geometry serves as this universal language, with the polynon providing a conceptual, cognitive architecture.

Additionally, further enquiry into the brain's natural affinity for geometric constructs, as argumented in the polynonial framework is essential: from embodying the progression of intrinsic geometric structures and cognitive operations, to geometrically influenced experiential phenomena. This investigation has the potential to reveal deep-seated insights into the fundamentally geometric nature of cognitive frameworks and processes, thereby deepening our comprehension of the intricate ties between the embodied processes and the emergent ones.

Moreover, it is imperative to further examine the processes of geometric constructs involved in building cognitive dimensions,

ranging from spatial navigation to the perception of aesthetics, beauty, and truth. Such an inquiry corroborates the polynon's theoretical underpinnings, extending its applicability across diverse cognitive domains, by highlighting the omnipresent role of geometry in shaping our perceptual and conceptual experiences, and revealing the intricacies of the polynonial illusion and the noumenal consciousness.

The shift toward a consciousness-centered scientific paradigm, while a theoretical venture, is proven here as a necessity. As such, the corporeal and the mental, the subjective and the objective are unified under the expansive canopy of the polynon, covering the divide between empirical science and spiritual inquiry and harmonizing the myriad facets of human experience.

Experience that drives a collective endeavor towards understanding consciousness, and marks a journey of self-discovery, by unfolding the neural correlates of consciousness, exploring the geometric foundations of thought, and striving to emulate cognition within synthetic frameworks. Through this unified pursuit, we gradually peel away the layers of *the grand illusion*, edging closer to a comprehensive grasp of consciousness that enlightens our understanding of the self and redefines our interaction with the cosmos.

Thus, we arrive at the realization that an enigmatic and inscrutable noumenal entity eludes capture through the relational attributes furnished by our senses. It compels us to acknowledge that since our faculty of external sense provides us only with relational information, the representations it produces can convey merely the object's relation to the subject, not the inherent characteristics of the object as it exists independently. This revelation positions the architecture of polynon as a critical juncture where the empirical and the transcendental converge. It acts as a reminder of the limits of our epistemic reach, allowing us to venture into the metaphysical and offering us a privileged perspective from which to ponder the mysteries of existence and the human condition.

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