

## Review Article

# Reconceptualizing Consciousness: Towards an Expanded Scientific Paradigm

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The profound challenge of phenomenal consciousness—the subjective "what it's like" to experience—persists as a central enigma in modern science. While neuroscience meticulously identifies neural correlates of consciousness (NCCs), this essay contends that such findings may represent proximate manifestations rather than the fundamental nature of consciousness itself. Drawing a parallel with historical paradigm shifts, we argue that current scientific explanations might be inherently limited by their foundational assumptions and methodologies. The core critique centers on the "subset problem": if consciousness is a superset encompassing brain structures, then attempting to define its totality solely through brain mechanisms (a subset) is intrinsically constrained. Scientific instruments, designed for the physical realm, prove inadequate for phenomena potentially transcending material dimensions, suggesting the existence of "rules beyond the brain." Given science's acceptance of abstract fundamentals like information and mathematical structures—entities not reducible to physical objects—consciousness could similarly be a primary, abstract constituent of reality. This renders the "hard problem" a consequence of applying subset-oriented tools to a superset phenomenon. Furthermore, cosmological observations hinting at universal interconnectedness and singularities where physics breaks down suggest a deeper, unifying entity, whose intrinsic principles are not fully explicable by current physical theories. Analogous to inferring a black hole's nature from its effects despite its unobservable interior, consciousness's intrinsic subjectivity remains inaccessible to physical measurement. Ultimately, while science provides invaluable models for brain function, its existing framework may be fundamentally insufficient to fully elucidate the deepest nature of subjective experience, thereby necessitating a broader conceptual paradigm.

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# Introduction

The very essence of being human, indeed of any conscious experience, hinges on a profound mystery: What is this inner world of thoughts, sensations, and personal perceptions we call consciousness? Despite its undeniable centrality to our existence, its origins and nature remain one of the most perplexing challenges in both science and philosophy. For decades, neuroscience has made remarkable strides, largely converging on the view that consciousness is an emergent property of the brain, arising from the intricate dance of billions of neurons and their complex interactions<sup>[1][2]</sup>. Groundbreaking research has unveiled a wealth of neural correlates of consciousness (NCCs), revealing specific brain activities that consistently align with particular conscious states, leading many to believe that a complete understanding of the brain will ultimately yield a full explanation of consciousness itself<sup>[3][4]</sup>.

However, even amidst these significant advancements, the deepest enigma—often termed the "hard problem of consciousness"—persists: how and why do physical processes in the brain give rise to subjective, qualitative experiences, the raw "feel" of seeing red or feeling pain<sup>[5]</sup>? This irreducible subjectivity, the very fabric of "my experience," proves elusive to third-person objective measurement<sup>[6]</sup>, leading to a crucial philosophical question: could the scientific framework, powerful as it is, be inherently limited in grasping the fundamental nature of consciousness itself? This essay argues that while current neuroscience adeptly describes the correlates and manifestations of consciousness, its foundational assumptions—rooted in methodological naturalism and physical reductionism—might render it incapable of answering what my experience is at its most fundamental level. Rather than being an emergent phenomenon, this paper posits that consciousness is foundational and intrinsically real to experience, obscuring a deeper, potentially non-physical or encompassing reality that lies beyond exclusive empirical scrutiny.

## 1. The Prevailing Scientific Paradigm: Foundations and Challenges

### 1.1. *The Brain as the Seat of Consciousness*

The predominant scientific consensus posits the origins of consciousness within the intricate neural architecture of the brain<sup>[1][2]</sup>. Extensive neuroscientific inquiry has provided compelling empirical support for this perspective, establishing robust correlations between distinct patterns of neural activity and subjective conscious experience<sup>[3]</sup>. Methodologies such as functional magnetic resonance imaging

(fMRI) and electroencephalography (EEG) have enabled the identification of Neural Correlates of Consciousness (NCCs)—defined as the minimal neuronal mechanisms sufficient for any specific conscious percept or experience<sup>[4][7]</sup>. Investigations utilizing these techniques consistently demonstrate that alterations in subjective awareness, ranging from the recognition of a familiar countenance to the apprehension of an emotional state, reliably correspond with distinct neural signatures across various cerebral regions<sup>[8][9]</sup>.

Further substantive evidence derives from observable effects of cerebral trauma, neurological pathology, and pharmacological intervention<sup>[10][11]</sup>. Focal lesions within specific brain areas can induce predictable and circumscribed deficits in conscious experience, exemplified by the loss of visual perception despite intact ocular function<sup>[12]</sup>, or profound alterations in volitional capacity and executive decision-making<sup>[13]</sup>. Pathological states such as coma, persistent vegetative states, and the complete suppression of consciousness under general anesthesia unequivocally illustrate how modifications to cerebral function dramatically impair or abolish conscious experience<sup>[13][14]</sup>. Conversely, direct intracranial electrical stimulation experiments, frequently conducted during craniotomies in awake patients, have shown that localized activation of cortical regions can reliably evoke specific conscious sensations, episodic memories, or even nascent intentions, thereby furnishing a direct constitutive or causal link between neural activity and phenomenal experience<sup>[15][16]</sup>. From an evolutionary perspective, consciousness is frequently conceptualized as an emergent property of neurobiologically complex organisms, selectively favored for its adaptive advantages in facilitating information processing, learning, strategic planning, and sophisticated environmental interaction<sup>[17]</sup>. This substantial corpus of empirical data constitutes the foundational premise for the scientific assertion that consciousness is, fundamentally, an intrinsic product of the brain<sup>[1][2]</sup>.

## *1.2. The "Hard Problem" as an Internal Discrepancy*

Despite the robust empirical framework detailed above, the prevailing scientific paradigm confronts a fundamental conceptual impasse, famously termed the "hard problem of consciousness" by philosopher David Chalmers<sup>[5]</sup>. This problem delineates the challenge of explaining how and why physical processes in the brain give rise to subjective, qualitative experiences, known as qualia—the intrinsic "what it is like" to perceive red, to feel pain, or to taste sweetness<sup>[5][6]</sup>. This profound issue is not merely a philosophical abstraction but is widely acknowledged by prominent neuroscientists and cognitive scientists who engage with the limits of their empirical methods<sup>[18][7][19]</sup>. Unlike the "easy problems" of

consciousness, which pertain to the functional aspects of cognitive processing (e.g., how the brain processes information, integrates sensory data, or controls behavior), the hard problem delves into the very nature of subjective experience itself, seeking to bridge the explanatory gap between physical brain states and phenomenal consciousness<sup>[5][20]</sup>.

Illustratively, even if science could precisely map every neuronal firing pattern, chemical reaction, and electrical impulse occurring when an individual experiences the color blue, the "explanatory gap" persists: why should that specific pattern produce the sensation of blueness, rather than mere information processing, or any other sensation<sup>[21][20]</sup>? The phenomenal quality of "my experience" remains stubbornly irreducible to objective physical descriptions of brain states, leaving open the question of why complex physical computation should be accompanied by any subjective experience at all<sup>[22]</sup>. This persistent lacuna within the physicalist account suggests that despite its immense success in elucidating the mechanisms and correlates of consciousness, the scientific paradigm, as currently conceived, may encounter inherent limitations in fully apprehending the fundamental nature of conscious reality<sup>[5][19]</sup>.

## 2. Beyond the Tangible: Redefining "Physical" and Abstract Reality

The persistent explanatory gap presented by the "hard problem" compels an examination of fundamental ontological assumptions within science, particularly the scope and evolving definition of what constitutes "physical" reality. While consciousness is often implicitly or explicitly confined to a materialist framework, a deeper look at the trajectory of scientific understanding reveals that the concept of "physical" has undergone profound transformations, extending beyond the intuitively tangible.

### 2.1. The Evolving Definition of "Physical"

Historically, the scientific understanding of "physical" was largely confined to matter and energy as distinct, particulate entities governed by deterministic laws. However, advancements in modern physics, particularly quantum mechanics and field theory, have dramatically reshaped this classical Newtonian view<sup>[23]</sup>. The notion of "solid" matter has dissolved into probabilities, quantum fields, and abstract symmetries<sup>[24][25]</sup>. Energy and mass are interconvertible, and the very fabric of spacetime itself is recognized as a dynamic, deformable entity<sup>[26]</sup>.

This evolution signifies a progressive abstraction of the "physical." Reality, at its most fundamental levels, is increasingly described not by directly observable properties of discrete objects, but by mathematical structures, relational properties, and fields that pervade space and time<sup>[27]</sup>. These are "physical" in the sense that they are quantifiable, adhere to universal laws, and are empirically verifiable through their effects on other phenomena, yet they are not "physical" in a classically intuitive, tangible sense. This expanded conceptualization of the physical realm provides a crucial backdrop for re-evaluating the potential nature of consciousness.

## *2.2. Information and Mathematical Structures as Precedents for Abstract Fundamentals*

Building upon the abstract nature of modern physical descriptors, it is pertinent to consider how established scientific disciplines already embrace concepts that are undeniably fundamental to reality but are not "physical" in a classically material sense: namely, information and mathematical structures. In contemporary physics, particularly in quantum information theory and the study of black holes, information is increasingly recognized as a foundational entity, perhaps even more fundamental than matter or energy<sup>[28]</sup>. The black hole information paradox, for instance, grapples with the principle that information, though seemingly consumed by a black hole, is theorized to be conserved or re-encoded, underscoring its inherent and irreducible quality within the universe's fabric<sup>[29][30]</sup>. Information, in this context, is not a physical substance but rather a pattern, a relationship, or a capacity for description and organization. Its "presence" is accepted and utilized due to its indispensable role in describing physical processes and the very coherence of the cosmos.

Similarly, mathematical structures form the bedrock upon which all physical laws are formulated, demonstrating an astonishing efficacy in describing and predicting natural phenomena with unparalleled precision<sup>[31]</sup>. The enduring question of whether mathematics is invented by the human mind or discovered as an inherent aspect of reality leans, for many physicists and philosophers, towards discovery, implying an independent, abstract existence for these structures<sup>[32]</sup>. These mathematical truths are non-physical, yet universally applicable and constitute the foundational grammar of the universe. Their "presence" is undeniable due to their immense explanatory and predictive power. The scientific acceptance of such abstract yet fundamental entities establishes a precedent for considering consciousness as potentially residing within this category—a property or principle of reality that is not reducible to material components, but is nonetheless fundamental to its existence and our experience of it.

### *2.3. Consciousness as an Abstract Fundamental Entity*

Given the precedence of information and mathematical structures as abstract yet fundamental components of the universe, it is conceptually coherent to postulate that consciousness itself might constitute another such fundamental, abstract entity<sup>[33][34]</sup>. This perspective diverges from emergent materialism, proposing that consciousness is not merely a late-stage product of complex neural computation, but rather an intrinsic property of reality at a foundational level, akin to a fundamental field or principle<sup>[35][36]</sup>. Such a view often aligns with philosophical positions like panpsychism or idealism, where consciousness is considered either an inherent property of all matter (even rudimentary forms) or the ground of all existence, from which the physical world itself emanates<sup>[33][34][37]</sup>.

In this framework, the human brain, rather than generating consciousness, would function as a specialized complex system that localizes, filters, or expresses this pervasive, fundamental consciousness in a particular, experiential form<sup>[37][38]</sup>. Analogous to how a radio receiver processes an omnipresent electromagnetic field into discernible music, the brain might act as a highly sophisticated transducer, rendering aspects of a universal consciousness into the individualized subjective experience of "my experience"<sup>[38]</sup>. Like information or mathematical truths, this fundamental consciousness would not be directly quantifiable by current physical instruments, as these tools are designed to measure material manifestations. Its "presence" would instead be inferred from its indispensable role in accounting for the irreducible nature of subjective experience, the very "what it's like," and its potential to underlie the coherent structure of reality, much as mathematical laws underpin physical laws<sup>[31][39]</sup>. This conceptual shift moves beyond a purely correlational understanding to propose consciousness as a primary ontological constituent, opening avenues for explaining its apparent irreducibility to purely physical terms.

## **3. Methodological Boundaries: The "Subset Concept" and Scientific Limits**

With a conceptual foundation laid for consciousness as a potentially abstract, fundamental entity, this essay now shifts focus to considering the implications for scientific methodology. This involves examining how the very nature of scientific inquiry, powerful as it is, might inherently operate within a domain that is a subset of the broader reality of "my experience." Rather than presenting a direct challenge to the validity of scientific methods, this section explores the perspective that these methods,

optimally designed for the physical and observable, may encounter intrinsic boundaries when attempting to fully account for a superset phenomenon like consciousness.

### *3.1. The Brain as a Subset: A Different Explanatory Angle*

The predominant neuroscientific paradigm, by asserting consciousness as an emergent product of the brain, implicitly positions the brain as the generative locus of subjective experience<sup>[1][2]</sup>. However, a critical philosophical contention arises if one postulates consciousness not merely as an emergent property, but as a more primitive, fundamental, or pervasive entity that encompasses the material brain and its structures<sup>[33][34]</sup>. In such a conceptualization, the brain, with its intricate neural networks and electrochemical processes, becomes a subset of consciousness, serving as a localized mediator, filter, or expression mechanism for a broader, foundational conscious reality<sup>[35][37][38]</sup>. This isn't viewed as a deficiency of the brain, but rather a different conceptual framework for understanding its role.

This ontological shift presents a significant methodological consideration for scientific inquiry. If the brain is merely a specialized component within a larger, more fundamental conscious domain, then attempting to fully define, explain, or quantify the entirety of consciousness solely by analyzing brain mechanisms becomes an intrinsically incomplete endeavor<sup>[36]</sup>. This is analogous to analyzing the intricate circuitry of a television set to understand the origin and content of a broadcast signal, or meticulously studying a single wave to comprehend the complete hydrological cycle and the ultimate nature of the ocean<sup>[35][37]</sup>. While such subset analysis provides invaluable insights into the localized manifestation and modification of the phenomenon, it inherently precludes a comprehensive understanding of the superset from which it derives or in which it is embedded. The scientific tools, by their very design, are optimized for dissecting and quantifying the material and observable. Thus, when applied to a potentially overarching consciousness, these tools might operate solely within the very subset they seek to explain, thereby limiting their capacity to grasp the encompassing whole<sup>[38]</sup>.

It is crucial to clarify that this conceptualization of the brain as a subset within a conscious superset does not necessitate a refutation of established neuroscientific principles or empirical findings. On the contrary, the discovery of Neural Correlates of Consciousness (NCCs), the precise mapping of brain functions, and the understanding of how brain damage alters experience all remain valid and invaluable within their respective domains<sup>[1][2][3][4][7]</sup>. For instance, understanding the intricate mechanics of a car engine is undoubtedly essential for its operation and repair, analogous to how neurobiology explains brain function; however, this mechanical understanding alone does not elucidate the broader concept of

"transportation" or the driver's subjective experience of the journey. Similarly, dissecting the hardware and software of a computer reveals its information processing capabilities, but does not inherently explain the fundamental nature of information itself, nor the user's subjective experience of interacting with it<sup>[36]</sup>. Therefore, neuroscientific methods remain indispensable for elucidating how consciousness manifests and is modulated within the physical brain, but they may not be equipped to address the ontological source or fundamental nature of consciousness if it resides at a more encompassing level of reality<sup>[38]</sup>. This perspective suggests a boundary to their explanatory power, rather than an invalidation of their empirical rigor.

### *3.2. Falsifiability and the Boundaries of Scientific Inquiry*

A cornerstone of modern scientific methodology is the principle of falsifiability, prominently articulated by Karl Popper<sup>[40]</sup>. A scientific hypothesis, according to this criterion, must be capable of being proven false by empirical observation or experiment. This distinguishes scientific theories from metaphysical or pseudoscientific claims, providing a mechanism for scientific progress through the rigorous testing and elimination of incorrect ideas. While this principle is undeniably powerful for investigating observable, measurable phenomena in the physical world, its application encounters inherent limitations when confronted with a phenomenon like consciousness, particularly if posited as a fundamental, abstract entity as discussed in Section 3.3.

If the very essence of "my experience" is fundamentally subjective and internal, directly inaccessible to third-person empirical measurement, then any hypothesis about its ultimate nature, beyond its physical correlates, may inherently evade falsifiability within a purely physicalist framework<sup>[5][6]</sup>. For example, a hypothesis asserting that fundamental consciousness pervades reality cannot be definitively disproven through the observation of physical brain states alone, because its nature transcends those states. One can observe what happens when a brain is damaged, leading to altered or absent conscious manifestations, but this does not falsify the proposition that consciousness, in a more fundamental sense, persists or operates beyond that particular physical expression<sup>[37][38]</sup>. The private, qualitative nature of phenomenal experience resists objective external scrutiny; a neuroscientist can record neural activity associated with pain, but cannot directly falsify my subjective experience of pain, nor verify that an absent NCC equates to an absent fundamental conscious experience in all possible realities<sup>[22][38]</sup>. This indicates not that such concepts are "unreal," but that they may reside beyond the current empirical reach



of science's falsification criterion, thereby marking a boundary to its explanatory completeness for consciousness.

### 3.3. *"Rules Beyond the Brain": Inherent Cognitive Limits and a Path for Expansion*

Beyond the methodological constraints of falsifiability, a deeper consideration involves the inherent limitations of human cognition itself, particularly the brain's capacity to comprehend its own most fundamental ground or that of the universe<sup>[19]</sup>. Philosophers like Colin McGinn have articulated the concept of "cognitive closure," positing that human minds, evolved for survival and navigating a mesoscopic world, may simply lack the conceptual machinery to grasp the ultimate solution to the mind-body problem or the nature of consciousness as a fundamental reality<sup>[19][41][42]</sup>. Our cognitive architecture, structured by sensory perception and logical reasoning within the empirical domain, might be inherently unequipped to bridge the explanatory gap between physical properties and subjective qualia, or to fully apprehend "rules" that operate beyond the brain's functional parameters<sup>[5][22][43]</sup>.

However, interpreting "cognitive closure" as an immutable blockade to scientific progress would be a profound misreading of this proposition. Instead, it serves as a critical indicator of our current limitations and a potent motivator for conceptual and technological innovation. Our brain, as a "transducer" or "expresser" of consciousness, is currently almost entirely occupied and engaged with the mundane sustenance activities essential for human survival and interaction: from basic physical body functions (nutrition, health, procreation) to complex social, cultural, relationship, political, economic, and scientific endeavors. These constant engagements consume a vast amount of the brain's processing power and functional capacity.

Herein lies a potential "way out" for science and human understanding. If, through technological advancement, future forms of automation, or through refined mental processes that alleviate the burden of unnecessary cognitive activities, we could somehow offload these fundamental, day-to-day functions, it might free up substantial cognitive resources. This freed capacity would not be about merely processing more information from the material universe (a concept distinct from Integrated Information Theory's, IIT's, complexity-dependent  $\Phi$ , which still originates from a limited idea of physicality). Instead, it could enhance the brain's innate capability to transduce and express more of the eternal superset of consciousness.

Consider the analogy of Artificial Intelligence: to train an AI and increase its capabilities, it must "churn" immense amounts of information into something meaningful. Its efficiency isn't just about the volume

of data, but its capacity to process, learn, unlearn, and relearn efficiently. Similarly, if the human brain can increase its "information processing efficiency"—not by acquiring more physical data, but by shedding the burden of mundane tasks and unburdening itself from superfluous mental activities—it could potentially elevate its ability to "capture" or resonate with more profound aspects of the fundamental, universal consciousness. This vision suggests a future where science can overcome apparent cognitive closure not by brute-forcing a material explanation, but by optimizing the brain's role as an interface, enabling it to access and express deeper realities of the conscious superset.

## 4. Cosmic Unification and a More Fundamental Reality

### 4.1. *Consciousness as a Unifying Principle*

The history of physics is marked by successive unifications, from Newton's synthesis of celestial and terrestrial mechanics to Maxwell's unification of electricity and magnetism, and Einstein's linkage of space, time, mass, and energy<sup>[44]</sup>. Contemporary theoretical physics continues this quest, striving for a "theory of everything" or a Grand Unified Theory (GUT) that can reconcile general relativity with quantum mechanics and describe all fundamental forces. Within this ongoing search for ultimate principles, consciousness, when conceptualized as an abstract fundamental entity rather than a merely emergent byproduct, emerges as a compelling, albeit unconventional, candidate for such a unifying principle<sup>[33][34]</sup>.

If consciousness is not merely an epiphenomenon of complex arrangements of matter but a pervasive aspect of reality, it could offer a novel framework for understanding the universe's inherent coherence. Theories such as Integrated Information Theory (IIT), for instance, propose that consciousness corresponds to the amount of integrated information a system possesses, suggesting that consciousness is a fundamental property of any system that integrates information, to varying degrees of complexity, rather than being exclusive to biological brains<sup>[7][45]</sup>. While IIT is a scientific theory, its ambition points towards a universal property. However, this approach faces significant conceptual and empirical challenges that highlight the very limitations this essay explores. A primary critique concerns IIT's lack of empirical testability, as the precise measurement of  $\Phi$  (the proposed measure of consciousness) in complex systems, let alone whole organisms, remains practically intractable and conceptually elusive<sup>[46]</sup>. More fundamentally, IIT posits that consciousness scales directly with the complexity and integration of a system, implying a graduated scale of consciousness where simple, less integrated systems possess

minimal  $\Phi$  (and thus minimal consciousness), while highly complex systems like the entire universe might exhibit maximal  $\Phi$ <sup>[7][45]</sup>. This aspect fundamentally contrasts with our thesis, which argues that the whole is not merely the sum or integration of individual parts, and that consciousness is a foundational and encompassing reality that gives meaning and coherence to the parts, rather than emerging from or being quantifiable by their complexity<sup>[47]</sup>.

A similar, crucial distinction must be drawn with certain interpretations of panpsychism. While panpsychism also posits that consciousness, in some form, is a ubiquitous and fundamental feature of the universe, inherent in matter or energy at all scales<sup>[33][35]</sup>, many of its versions, particularly constitutive panpsychism, suggest a gradation of consciousness that scales with the complexity and organization of matter—from a basic "awareness of existence" in elementary particles to the rich, complex experiences of organisms. This perspective, where consciousness builds up from simpler parts to form more complex "features" based on material complexity, shares a conceptual similarity with the very complexity-driven scaling critiqued in IIT. In contrast, this essay's thesis posits that the fundamental consciousness is an encompassing superset, not inherently divided or graded by the physical systems it expresses through. The brain's complexity, then, dictates not the degree of fundamental consciousness, but the sophistication and richness of its transduction or expression within the physical realm. Just as a modern computer system, with its vastly increased complexity over earlier models, performs operations with more data and features, it doesn't imply a fundamentally "more" conscious computer, but rather a more complex processing capability. Similarly, the intricate organization of the brain allows for a highly differentiated and specific manifestation of a fundamental, ubiquitous consciousness, enabling experiences of pleasure, pain, or sensory qualia, without suggesting that the fundamental consciousness itself is somehow "more" or "less" present. While panpsychist frameworks grapple with conceptual challenges like the "combination problem" and empirical testability, the ongoing scientific debates in consciousness studies increasingly highlight the need to consider such fundamental approaches to move beyond mere correlation and address the core nature of subjective experience<sup>[46][48]</sup>.

#### *4.2. Implications for the Nature of Reality*

If consciousness is indeed a fundamental, pervasive entity, the implications for our understanding of reality are profound, extending far beyond merely identifying brain correlates. This perspective moves beyond the traditional materialist ontology, which posits matter and its interactions as primary, and

instead suggests a universe in which consciousness is either primary, or at least a foundational constituent inextricably interwoven with the fabric of existence<sup>[34][33]</sup>. Such a view inherently addresses the "hard problem" not by explaining consciousness away as a mere brain function, but by positing its fundamental nature as the very ground from which both physical reality and subjective experience arise<sup>[5][34]</sup>.

Furthermore, the concept of a fundamental, encompassing consciousness provides a compelling philosophical resolution to the challenge of radical reductionism, which often struggles to explain how complex systems exhibit properties not present in their individual components<sup>[49]</sup>. In a purely reductionist framework, the universe is seen as ultimately reducible to its smallest, most fundamental physical constituents, with the properties of the whole merely being the sum of its parts. However, this often leads to an explanatory deficit for emergent phenomena like consciousness, where the subjective "what it's like" seems irreducible to neuronal firing<sup>[5][21]</sup>. From the perspective of consciousness as a superset, the whole is profoundly greater than the mere aggregation of its parts; indeed, the very coherence and meaningfulness of the individual parts may only become apparent in the context of the encompassing whole<sup>[47]</sup>. Without such a unifying principle, many fundamental observations and cosmological conundrums—such as the seemingly random accelerated expansion of galaxies, the unresolved debates between single-universe and multiverse hypotheses, or the ultimate destiny of the cosmos—might appear as a collection of disconnected, stochastic events. A fundamental consciousness could thus serve as the underlying context or medium that bestows organization, coherence, and intrinsic meaning upon the universe's constituents, preventing a fragmented reality where parts lack inherent relationality beyond mechanical causation<sup>[34][49]</sup>. This offers a path towards reconciling the seemingly disparate realms of objective physical description and subjective phenomenal reality. It suggests that the inherent structure and constants of the universe, which mathematical expressions describe, could be expressions of this fundamental conscious reality<sup>[50]</sup>. Rather than seeing consciousness as an isolated phenomenon confined to biological brains, this broader ontological shift invites a view of reality where consciousness is an intrinsic, unifying dimension, challenging us to expand our scientific and philosophical paradigms to encompass its full, fundamental scope.

## 5. Historical Parallels and Analogies

The history of science is replete with instances where prevailing paradigms, once considered immutable, were profoundly re-evaluated in the face of persistent anomalies or new empirical discoveries. These

revolutions often necessitated a radical expansion or redefinition of what was considered "real" or within the scope of scientific inquiry. Drawing parallels to these historical shifts can illuminate how our current understanding of consciousness might similarly require a fundamental re-conceptualization.

### *5.1. The Copernican Revolution*

One transformative intellectual shift, the Copernican Revolution, offers a compelling parallel for the conceptual reorientation potentially required in our understanding of consciousness. For millennia, humanity held a geocentric worldview, believing the Earth to be the immovable center of the universe, with all celestial bodies orbiting around it<sup>[51]</sup>. This perspective was not only intuitively appealing—after all, we don't feel the Earth moving—but also deeply ingrained in philosophical and theological doctrines of the time<sup>[52]</sup>. However, the accumulated observational data, particularly the retrograde motion of planets, increasingly strained the complexity of the geocentric Ptolemaic system, requiring ever more elaborate epicycles to explain the celestial mechanics<sup>[51]</sup>.

Nicolaus Copernicus, and later Johannes Kepler and Galileo Galilei, fundamentally challenged this anthropocentric view by proposing a heliocentric model, placing the Sun at the center of the solar system<sup>[51]</sup>. Initially met with strong resistance due to its counter-intuitive nature and challenge to established thought, the heliocentric model eventually prevailed because of its elegant simplicity, superior explanatory power for planetary motions, and greater mathematical coherence<sup>[52]</sup>. The analogy to consciousness is profound: just as the Earth was dethroned from its central cosmic position, the human brain, currently seen as the exclusive generator of consciousness, might similarly be understood as a localized transducer or expresser for a more fundamental, pervasive conscious reality, as discussed in Section 3.3. This shift implies moving from a "brain-centric" view of consciousness to one where the brain mediates a vaster, universal principle. While this idea may initially appear counter-intuitive, much like heliocentrism once did, it offers a more coherent framework for reconciling the subjective "what it's like" with the objective physical world, moving away from the complexities of explaining a fundamental phenomenon solely through its local physical manifestations.

### *5.2. The Shift from Classical to Quantum Physics*

Another profound paradigm shift in human history occurred in the early 20th century with the advent of quantum mechanics, fundamentally altering the deterministic, tangible worldview inherited from Newtonian classical physics<sup>[23]</sup>. Under the classical model, the universe was conceived as a grand,

predictable machine composed of discrete particles interacting according to immutable laws, where every cause had a definite effect and phenomena were intuitively comprehensible<sup>[26]</sup>. However, experimental observations at the atomic and subatomic scales—such as black-body radiation, the photoelectric effect, and atomic spectra—stubbornly defied classical explanations, accumulating as severe anomalies<sup>[53]</sup>.

Quantum mechanics, developed to account for these observations, introduced concepts that were profoundly counter-intuitive and, initially, met with considerable resistance even from its pioneers. Wave-particle duality, where entities like electrons behave as both particles and waves; the inherently probabilistic nature of quantum events, replacing classical certainty; and non-locality, where entangled particles appear instantaneously connected regardless of distance, shattered the classical notions of independent existence and local causality<sup>[24][25][54]</sup>. Furthermore, the observer effect, where the act of measurement influences the state of a quantum system, introduced a perplexing relationship between consciousness (or at least observation) and the observed reality that remains a subject of intense debate<sup>[55]</sup>. This revolution demonstrated that the "physical" realm was far stranger and more abstract than previously imagined, forcing science to broaden its ontological canvas to include phenomena that defy direct sensory experience and common-sense intuition, yet are empirically verified and mathematically coherent<sup>[27]</sup>. The acceptance of quantum mechanics, despite its conceptual challenges, was driven by its unparalleled predictive power and its ability to explain phenomena utterly beyond classical physics, providing a powerful analogy for how our understanding of consciousness might demand a similarly radical, yet empirically justified, re-evaluation of fundamental reality.

### *5.3. The Discovery of Invisible Forces*

A final, illustrative parallel can be drawn from science's repeated discovery and acceptance of invisible, intangible forces and entities that fundamentally shape our reality, even though they cannot be directly observed or touched. For centuries, gravity, for example, was understood through its effects (objects falling, planets orbiting) long before Newton provided a mathematical description or Einstein redefined it as a curvature of spacetime<sup>[26]</sup>. Electromagnetic forces, too, remain unseen, yet their profound influence is evident in everything from light to electricity, validated by their consistent and predictable effects on measurable phenomena<sup>[44]</sup>. More recently, the existence of dark matter and dark energy has been posited, not because they are directly detectable, but because their gravitational effects are necessary to explain the observed rotation of galaxies and the accelerating expansion of the universe<sup>[56]</sup>. These

entities are entirely abstract and inferential, yet they are accepted as fundamental components of the cosmos due to their explanatory power and empirical necessity.

The trajectory of scientific discovery, therefore, reveals a consistent pattern: reality extends far beyond the realm of what is immediately perceptible. Just as gravity, electromagnetism, and dark matter/energy are accepted as fundamental despite their invisibility, so too might a fundamental consciousness be understood. While subjective experience—"what my experience is"—cannot be directly observed by external instruments, its undeniable reality and its potential role in providing coherence to a seemingly fragmented universe (as argued in Section 5) could necessitate its acceptance as a fundamental, albeit abstract, aspect of reality<sup>[33][34]</sup>. Its "invisibility" to physical instruments would then be seen not as an argument against its existence, but as a characteristic of its foundational nature, similar to other ubiquitous yet unobservable forces.

## 6. The Enduring Role of Science in Understanding Consciousness

The proposition that fundamental consciousness, particularly the irreducible "what my experience is," may lie beyond the current explanatory reach of reductionist science could naturally provoke a critical question: Does this render decades of meticulous neuroscientific inquiry into consciousness moot, and if the ultimate truth is inaccessible, why pursue it at all? This essay unequivocally asserts that such a conclusion would be a profound misinterpretation of its central thesis.

Firstly, the insights gleaned from neuroscientific and cognitive studies on consciousness are far from useless; they are indispensable. The mapping of Neural Correlates of Consciousness (NCCs), the understanding of how brain damage alters experience, and the exploration of various conscious states (e.g., sleep, anesthesia, coma) provide invaluable knowledge about the manifestations, mechanisms, and modulation of consciousness within the physical realm<sup>[1][2][3][4]</sup>. These studies elucidate the "rules of the subset"—how consciousness is expressed, regulated, and constrained through its interaction with the brain, acting as a sophisticated transducer or expresser<sup>[35][37][38]</sup>. Science excels at identifying these correlations and understanding the physical machinery involved, and its continued pursuit in these areas is crucial for medical advancements, understanding cognitive processes, and even developing advanced artificial intelligence. The essay's argument is not that these studies are invalid, but rather that their explanatory power hits a boundary when attempting to account for the ontological source or fundamental nature of subjective experience itself, rather than its physical correlates or functional aspects.

Secondly, the assertion that fundamental consciousness is "beyond the reach of science" is not a call for intellectual surrender, but rather a clarion call for an expanded scientific paradigm. As highlighted by the historical parallels in Section 6, science has repeatedly demonstrated its capacity to broaden its understanding of "reality" beyond immediate empirical grasp—from accepting invisible forces like gravity and electromagnetism to embracing the counter-intuitive probabilistic nature of quantum mechanics<sup>[23][44][53][56]</sup>. These shifts were not dismissals of scientific inquiry, but rather evolutions of its framework to accommodate truths previously considered beyond its scope. Similarly, the "hard problem" of consciousness challenges science not to abandon the field, but to potentially expand its ontological and methodological toolkit, possibly integrating insights from philosophy and first-person phenomenology in novel ways. The purpose of this current intellectual exercise is precisely to articulate this need for paradigm shift, to lay the conceptual groundwork for a science that can ultimately reconcile objective empirical data with the undeniable subjective reality of experience.

Finally, the concern over the purpose of such inquiry, if direct scientific explanation remains elusive, misunderstands the multifaceted value of understanding consciousness. Beyond its intrinsic philosophical intrigue, a deeper, non-reductionist understanding of consciousness could have profound implications. For Medicine, it could fundamentally alter our approach to disorders of consciousness, pain management, and mental health by shifting focus from purely material interventions to understanding the underlying consciousness itself. For Technology, it might guide the development of truly conscious AI, moving beyond mere computational mimicry to genuinely subjective experience, if such is even possible. For Human Experience, it offers a more coherent, unifying worldview where "my experience" is not an anomalous byproduct but an integral, foundational aspect of the cosmos. This provides profound existential meaning and informs our understanding of our place in the universe, bridging the current chasm between scientific materialism and subjective human experience. Therefore, while the direct scientific measurement of fundamental consciousness may remain beyond current instrumental and conceptual capabilities, studying its manifestations, exploring its boundaries, and constructing coherent theoretical frameworks for its nature remain among the most vital and transformative endeavors of human intellect.

## 7. Conclusion

This essay has meticulously navigated the epistemic chasm that persists in fully accounting for consciousness, particularly the irreducible sentience encapsulated within "my experience." Despite the



profound advancements of reductive neuroscientific inquiry in delineating the neural correlates of consciousness (NCCs) and their intricate functional alignments<sup>[1][2]</sup>, this empirical prowess confronts an ontological impasse—the “hard problem”<sup>[5]</sup>. It is the persistent enigma of how and why the mechanistic symphony of neuronal activity culminates in the qualitative, subjective fabric of raw phenomenal awareness, a domain resistant to third-person objective capture<sup>[6]</sup>.

The prevailing scientific methodology, calibrated for the quantifiable and the empirically tractable, reveals an inherent domain specificity, encountering profound instrumental limitations when probing the foundational nature of consciousness. Our exploration posits that the brain operates not as the generative fount of experience, but as a sophisticated transducer or expresser<sup>[35][37][38]</sup> of a more pervasive, fundamental conscious reality. This paradigm implies that attempts to comprehensively delineate the superseding phenomenon of consciousness solely through the lens of its local physical subset are inherently conceptually constrained. Moreover, the very canons of scientific rigor, including the strictures of falsifiability<sup>[40]</sup>, may prove insufficient for hypotheses concerning an abstract, foundational consciousness that inherently eludes direct empirical refutation. Compounding this, our evolved cognitive architecture itself may present intrinsic perceptual confinement, limiting our capacity to grasp such an ultimate ontological ground<sup>[19][41]</sup>. However, this is not an insurmountable barrier, but a challenge that could be addressed by optimizing the brain’s capacity through both technological advancements and refined mental processes that free up cognitive resources for deeper engagement with fundamental consciousness.

Crucially, this critique of methodological limitations is not a refutation of neuroscience’s empirical rigor, but rather an invitation to expand our conceptual framework. We proposed that consciousness, like information and mathematical structures, could be an abstract fundamental entity woven into the fabric of reality itself<sup>[33][34]</sup>. Such a fundamental consciousness offers a powerful candidate for a unifying principle of the cosmos, providing coherence and meaning to the universe’s constituents beyond mere stochastic interactions, and offering a profound philosophical resolution to the challenges of radical reductionism<sup>[49][47]</sup>. This ontological shift echoes pivotal moments in scientific history—from the Copernican Revolution repositioning Earth from the cosmic center<sup>[51]</sup>, to quantum mechanics revealing a probabilistic and non-intuitive physical reality<sup>[23]</sup>, and the acceptance of invisible forces like gravity and dark matter based solely on their effects<sup>[56]</sup>. Each of these revolutions necessitated science to transcend its immediate empirical boundaries and embrace a more expansive understanding of reality.

In conclusion, the enduring mystery of "what my experience is" suggests that our current scientific paradigms, while immensely powerful, may be operating within a limited ontological scope. A complete understanding of consciousness, and by extension, the nature of reality, may require a new scientific revolution: one that expands its definition of "physical" to include abstract, fundamental entities, acknowledges its inherent methodological boundaries when confronting a superset phenomenon, and recognizes consciousness not as an emergent byproduct, but as a foundational and intrinsically real aspect of existence. This broader perspective promises a more unified and coherent understanding of the universe, where the subjective reality of experience finds its rightful place within the cosmos.

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## Declarations

**Funding:** No specific funding was received for this work.

**Potential competing interests:** No potential competing interests to declare.