

A PHILOSOPHICAL ANALOGY BETWEEN QUANTUM THEORY AND PHENOMENAL CONSCIOUSNESS

Konstantinos Voukydis

Dept. of History and Philosophy of Science
National and Kapodistrian University of Athens,
GREECE

kvoukydis@gmail.com

Abstract. This study outlines the core objective: to explore an analogical argument between quantum mechanics and phenomenal consciousness. The work proposes that phenomenal consciousness and quantum phenomena share structural features—such as observer-dependence, contextual emergence, and perspectival constitution—that justify the use of analogy not as metaphor, but as a philosophical method. It also critically examines the status, limits, and epistemic implications of analogical reasoning in this context.

Keywords: quantum mechanics, phenomenal consciousness, observer-dependence, emergence, perspectival constitution

INTRODUCTION

Despite remarkable interdisciplinary advances in the study of philosophy of mind, there remain persistent conceptual gaps at the heart of its domains that resist resolution through standard explanatory strategies. In the study of philosophy of consciousness specifically, this takes the form of what David Chalmers famously called “the hard problem”—namely, the challenge of explaining how and why subjective experience arises from physical processes in the brain. While the so-called “easy problems” of consciousness address how the brain performs functions like attention, discrimination, and information integration, the hard problem concerns the first-person perspective itself: the “what-it-is-like” character of phenomenal states¹.

A structurally analogous challenge arises in the foundations of quantum mechanics. Despite being the most empirically successful physical theory to date, quantum theory contains its own unresolved interpretive dilemma: the measurement problem. At its core lies a conceptual discontinuity between the mathematical formalism of quantum theory—which allows quantum systems to exist in superpositions of multiple potential states—and the definite outcome observed when measurements are performed. This discontinuity raises conceptual questions about the relationship between observer and system, as well as between parts and wholes. Specifically, it calls into question whether the components of a quantum system can be fully individuated and described independently of the system as a whole.

These two problems—the hard problem of consciousness and the quantum measurement problem—arise in distinct scientific and philosophical contexts, yet they share a common structural form. Both confront the difficulty of explaining the transition from potentiality to actuality, from multiplicity to unity, from abstract formal description to concrete lived or observed reality. Both also involve epistemic transitions, where the very act of knowing appears to co-constitute what is known. Notably, they raise symmetrical interpretive questions:

- How does reality shift from objective multiplicity to subjective unity?
- How do we move from the whole system to individual experience or observation?

These structural parallels invite deeper philosophical reflection. Perhaps the persistent difficulties encountered in both domains do not stem solely from empirical insufficiencies or technical gaps, but from foundational epistemic and metaphysical assumptions—particularly the enduring separation of subject and object, observer and observed, part and whole, mind and matter. If so, then it may be possible to explore a shared conceptual framework, grounded in perspectival reasoning and contextual ontology, that illuminates

both problems by revealing the underlying structure of our knowledge and the reality it discloses.

ANALOGY AS A TOOL FOR BRIDGING CONCEPTUAL GAPS

1. THE ROLE OF ANALOGY IN EARLY MODERN SCIENCE AND PHILOSOPHY

From the early seventeenth century onward, analogy played a central—though increasingly contested—role in the development of modern science and philosophy (Foucault 1970, 56). While the Renaissance worldview had embraced *analogy* and *similitude* as organising principles of knowledge, the rise of mechanistic science sought a clearer divide between descriptive fidelity and poetic or symbolic thinking. Yet, even amid the methodological turn toward precision, analogy persisted as a powerful epistemic tool.

Francis Bacon, in *The Advancement of Learning* (1605), recognised the usefulness of analogical inference as a heuristic device. Although critical of "idols of the mind" and mystical resemblances, he did not entirely reject analogical thinking. Instead, he sought to discipline analogy under empirically grounded reasoning. Bacon considered analogies useful for developing provisional hypotheses, particularly when confronting hidden processes in nature that elude direct observation.

Isaac Newton explicitly defended analogical reasoning in his third Rule of Reasoning in Philosophy from the *Principia Mathematica* (1687/1999), where he argued that "to the same natural effects we must, as far as possible, assign the same causes." His famous claim that "Nature is ever consonant with itself" (Rule III) implies an ontological continuity across domains—a justification for transferring knowledge from known systems (like celestial mechanics) to unknown ones (like terrestrial physics or biology). This analogical confidence proved productive: eighteenth-century physiology often modelled bodily systems after Newtonian mechanics, treating organs as pumps, levers, and filters.

In Kant's critical philosophy, analogy took on a transcendental function. In the *Critique of Pure Reason* (A176/B218–A218/B265), Kant introduces the *Analogies of Experience*, which are not merely heuristic devices but a priori principles governing the temporal structure of perception. For Kant, analogy is not just a comparison between particulars; it expresses necessary relational structures (e.g., causality, simultaneity) that make coherent experience possible. Furthermore, Kant appeals to teleological analogies—particularly in biology—where mechanical explanation proves insufficient. Here, he grants analogy a regulative role, guiding inquiry into living systems even when full explanation remains unavailable.

Even as the Enlightenment prioritised mathematical clarity and empirical rigour, analogy remained vital for engaging with phenomena that eluded strict formalisation. Thinkers like Goethe and Schelling employed analogies not only poetically but philosophically, treating nature as a living, self-organising whole. Their use of analogy allowed a non-mechanical understanding of organic and mental life, suggesting that structural similarity could reveal deep ontological connections beyond surface causality.

What we may more meaningfully bring into focus is that analogy remains a deeply embedded, if unofficial, method of knowing, even after the "disqualification" of resemblance as a basis for truth. Even if we cannot assume that analogy reflects a deep cognitive mode that mirrors the structure of reality itself, modern science and philosophy of science are still, in deep ways, indebted to analogy—not as primitive resemblance, but as structured similarity, proportional relation, and dynamic mapping.

2. THE NEED FOR ANALOGICAL TOOLS IN IRREDUCIBLE DOMAINS

In domains where the objects of inquiry resist direct observation, formalisation, or reductive decomposition, analogical reasoning becomes not merely useful but methodologically indispensable, providing a structured means of engaging with conceptual opacity and ontological complexity. On the one hand, we might say that analogy plays a vital role in model-building, hypothesis formation,

and conceptual innovation—especially when dealing with phenomena that evade direct empirical access. In particular, where the traditional subject-object dichotomy falters, analogy provides a relational logic that can bridge otherwise incommensurable explanatory domains.

On the one hand, analogy plays a vital role in model-building, hypothesis formation, and conceptual innovation—especially when grappling with phenomena that evade direct empirical access. On the other hand, it remains in tension with the dominant ideals of modern scientific rationality, which prioritise deductive certainty, empirical verification, and linear causal explanation. This epistemic double status places analogy at a unique crossroads: both as a creative heuristic and a contested form of justification.

The key philosophical insight guiding this framework is that analogies are not epistemic “gaps” to be eliminated, but structured inferences that extend known relations to new domains. Far from functioning as mere cognitive scaffolding, analogies enable us to map known relations from systems we understand onto domains that resist direct description, thereby generating insight and coherence.

Phenomenal consciousness and quantum phenomena are exemplary in this respect. Both exhibit:

- Observer-dependent features
- Emergent structures
- Contextual behaviour
- Discontinuities between formal description and lived or observed reality

Moreover, both domains pose explanatory gaps that are not merely empirical but structural. In the case of phenomenal consciousness: *How do physical neural patterns give rise to subjective, first-person experience?* In quantum mechanics, *How does a probabilistic superposition transit to a definite measurement outcome?* These are not mere technical gaps; they point to structural discontinuities between different levels of description. Analogical reasoning may help us navigate these

discontinuities by identifying formal and structural similarities across domains, without forcing premature reduction or metaphysical collapse.

Additionally, in both domains, we are dealing with systems whose behaviour cannot be understood merely by analysing their parts in isolation. Phenomenal consciousness is not reducible to individual neurons or brain states, but arises from integrated, temporally extended, perspectival processes. Likewise, quantum behaviour emerges from whole-system configurations rather than localised components. Similarly, quantum systems exhibit holistic behaviour—such as entanglement—that defies classical localisation or part-whole separability².

Crucially, both domains share a deep epistemological challenge: they cannot be fully accessed or described from a detached, external vantage point. Phenomenal consciousness is essentially first-person, and external accounts always risk omitting the qualitative texture of experience. In quantum mechanics, measurement is not neutral—it actively participates in shaping the system, rendering observer-independent descriptions fundamentally incomplete.

Given these parallels, analogical reasoning becomes not only useful but epistemologically responsible. It encourages a kind of epistemic humility: a commitment to a contextual, perspectival, and interpretative model that honours the complexity of the phenomena rather than forcing conceptual closure. As such, analogy offers more than a linguistic convenience—it provides a structural mapping that can guide interpretation, and even reshape our assumptions of how we get knowledge to the world.

As Paul Bartha suggests (Bartha 2010), analogical arguments can justify conceptual transfer across domains when similarities are deep and systematic. In articulating an analogy between the perspectival structure of phenomenal consciousness and the observer-dependent framework of quantum reality, we are not collapsing one into the other, nor making merely metaphorical gestures. Rather, we are using analogy as a philosophical instrument—not to explain

away consciousness via physics, but to reframe both domains as co-emergent aspects of a unified, participatory ontology.

THE ANALOGICAL ARGUMENT OF QUANTUM MECHANICS AND PHENOMENAL CONSCIOUSNESS

1. STRUCTURAL PARALLELS

At its core, the analogical framework rests on a shared resistance to complete objectification in both quantum physics and the study of phenomenal consciousness. Neither domain can be fully accounted for through third-person, detached observation; both demand a reconceptualisation of knowledge and being as contextual and perspectival.

In the case of quantum mechanics, reality does not consist of fully determinate, observer-independent properties. Instead, quantum systems exist in states of superposition until a measurement occurs, and the outcome depends on the context of observation, including the choice of measurement setup. The observer is not external to the system but actively participates in the emergence of definite outcomes, introducing a profound form of observer-dependence and contextuality (Bohr 1935; Wheeler 1983; Rovelli 1996).

Similarly, phenomenal consciousness—the "what-it-is-like" aspect of experience—cannot be meaningfully described as a static object or reducible state. It is inherently perspectival: it always occurs for someone, from a particular vantage point, and in a particular context of experience. It can also be considered contextual (emerging from the interplay between self and world) and self-referential (referring to its intrinsic capacity to incorporate itself within its own experiential framework) [Chalmers 1996; Zahavi 2005]. A structural analogy can be phrased as follows:

Just as quantum physical reality does not exist in a fully determinate and observer-independent form prior to measurement, but rather emerges through the contextual interaction between system and observer, so too

phenomenal consciousness cannot be understood as a pre-given, objective entity, but only as a contextually relational and perspectival process that arises through the interaction of subject and world.

In both domains, reality is not “already there” in a fully articulated, detached form; instead, it is co-constituted through the interplay of the observer and the observed, the knower and the known. Thus, the analogy rests on a shared participatory ontology, in which epistemic access to reality (how we come to know) carries ontological implications (what reality is). This challenges the traditional ideal of total objectivity and instead affirms that meaningful reality arises through interaction, situatedness, and perspectival engagement (Heisenberg 1958; Varela, Thompson & Rosch 1991).

Crucially, it is important to mention again that this structural analogy does not imply identity between the two domains—quantum systems are not conscious, and phenomenal consciousness is not simply a quantum effect. Rather, the analogy offers a philosophically significant mapping that allows us to reframe both phenomenal consciousness and quantum reality as irreducible, participatory processes that resist full externalisation or reification.

To clarify the analogy, we may identify four key structural parallels:

- I. Observer-dependence in quantum mechanics ↔ Perspective-dependence in phenomenal consciousness
 - In quantum mechanics, the outcome of an observation depends on the experimental setup and the interaction with the observer.
 - In consciousness, phenomenal experience is always bound to a first-person perspective—there is no “view from nowhere.”
- II. Collapse of superposition to an actual physical outcome ↔ Formation of a coherent experience in the present moment
 - Measurement collapses a quantum system from a set of potential possibilities to a single actual outcome.

- Phenomenal experience is actualised as a coherent moment of lived experience—a shift from multiple potential meanings or stimuli into a single, immediate present (Varela 1999).
- III. Quantum entanglement ↔ Whole-part relation in phenomenal consciousness
- Quantum entanglement reveals that certain systems exhibit non-separable, holistic properties—such that the system as a whole cannot be fully understood by analysing its parts in isolation.
 - Phenomenal consciousness emerges from an embedded relation to the world, shaped by the subject's capacities for interaction and its environmental coupling.
- IV. Contextuality in quantum mechanics ↔ Perspectival framing of meaning and knowledge
- The outcome of quantum measurements depends on the context; there is no “predefined property” waiting to be revealed.
 - Phenomenal consciousness is likewise context-sensitive: meaning is not intrinsic but emerges from the perspective and situation of the conscious subject.

2. THE TYPE OF ANALOGICAL ARGUMENT AT PLAY

Philosophically, the argument aligns with what Paul Bartha (2010) terms an analogical argument by explanatory extension. This form of reasoning justifies the transfer of conceptual structures from a source domain to a target domain, based on the presence of systematic structural similarities. In this case:

- The source domain is quantum mechanics, which has developed a rigorous, though interpretively diverse, framework for dealing with observer-dependence, emergence, and contextuality.
- The target domain is phenomenal consciousness, which lacks a unified theory but exhibits comparable structural features—

particularly its resistance to reduction, its perspectival nature, and its embeddedness in subject–object dynamics.

Quantum theory may offer a language and structure that, when analogically applied, can reorient our epistemic and metaphysical assumptions about phenomenal consciousness—not by providing a mechanistic explanation, but by suggesting a contextual, process-oriented, and participatory model. It is this qualitative and perspectival nature of phenomenal consciousness that makes it particularly amenable to analogical exploration alongside the participatory structure of quantum mechanics.

Under this view, we may define phenomenal consciousness as follows:

Phenomenal consciousness is an active, meaning-generating process that mediates between subject and world. It refers to the qualitative, first-person character of experience and can be understood as the local perspective at the interface between subject and object.

THE EPISTEMIC STATUS AND PHILOSOPHICAL LIMITS OF THE ANALOGY

While the analogy between quantum mechanics and phenomenal consciousness offers a potentially generative framework, its philosophical legitimacy must be assessed according to standard criteria for evaluating analogical reasoning. In both the philosophy of science and informal logic, strong analogical arguments are typically (Bartha 2010; Hesse 1966):

- a. Similarity of relevant structures
- b. Richness of shared relations and patterns
- c. Explanatory power in the target domain
- d. Absence of decisive disanalogies

A. SIMILARITY OF RELEVANT STRUCTURES

The analogy at the heart of this framework stands on two strong

structural parallels. Both quantum systems and phenomenal consciousness challenge the traditional subject-object dichotomy and highlight the perspectival nature of experiencing reality:

- In quantum mechanics, the observer is an active participant in the manifestation of physical reality (Bohr 1935; Wheeler 1983).
- Similarly, phenomenal consciousness is a subjective, perspectival process—it is *what-it-is-like* for a subject to experience, and as such, is irreducible to third-person description (Nagel 1974; Chalmers 1996).

Both domains emphasise contextuality and non-linearity. They require abandoning a purely mechanistic, detached view of explanation in favour of frameworks that recognise the interdependence of observer and system.

B. RICHNESS OF SHARED RELATIONS AND PATTERNS

The analogy deepens further when one shifts focus from entities to processes, from substance metaphysics to interaction and participation. Quantum physics and phenomenal consciousness both exhibit non-trivial emergence, in which wholes are not reducible to their parts:

- Quantum entanglement reveals non-local correlations that defy classical separability.
- Phenomenal consciousness too arises from integrated, dynamic patterns of subject-world interaction and affective-cognitive organisation.

The analogy thus draws on shared patterns of emergence, limitation, and perspectival framing, reinforcing its structural coherence.

C. EXPLANATORY POWER IN THE TARGET DOMAIN (PHENOMENAL CONSCIOUSNESS)

While the analogy does not claim to “solve” the hard problem of

consciousness, it offers a conceptual reframing that expands the space of philosophical inquiry:

- It resists both materialist reductionism (which treats consciousness as a byproduct of physical computation) and ontological idealism (which denies the reality of the physical world).
- Instead, it opens a middle path toward a non-reductive, participatory ontology, in which subjectivity and objectivity co-emerge through relational processes.

This allows us to view self-referentiality, perspectivism, and phenomenal presence not as anomalous features of the world, but as integral to its unfolding structure.

D. DISANALOGIES AND POTENTIAL WEAKNESSES

Despite its strengths, the analogy faces legitimate limitations, which must be acknowledged to avoid category error or overreach:

- Quantum mechanics is a formalised mathematical framework with experimentally verifiable predictions, while phenomenal consciousness is qualitative, non-formalizable, and not directly measurable.
- Quantum features like superposition, entanglement, or wavefunction collapse are physical processes (whether metaphysical or operationalist), whereas consciousness involves meaning-making, which belongs to a different order of description (Dennett 1991; Block 1995).
- There is a risk of category error or metaphorical overreach if the analogy is treated literally rather than heuristically or structurally.

Yet even with these disanalogies, the analogy retains philosophical value when used heuristically and structurally rather than mechanistically. It does not offer a unifying theory but a conceptual framework that fosters cross-domain insight.

PHILOSOPHICAL PRECEDENTS OF SIMILAR ANALOGICAL USES

The analogical strategy employed here is not without precedent in the philosophical tradition. On the contrary, it resonates with

several historical approaches that have used analogy to rethink the structure of reality and experience:

- Alfred North Whitehead's process philosophy relies on analogy between physical events and experiential moments, describing reality as composed of "actual occasions" that are relational, temporal, and internally structured. Although his physics was pre-quantum, his metaphysical vision anticipated many of the relational features now central to quantum theory (Whitehead 1929).
- Niels Bohr's complementarity principle suggested that different perspectives (e.g., particle vs. wave) are not contradictory but mutually necessary to fully understand quantum phenomena. This idea has been extended analogically to epistemology, highlighting the value of perspectival integration in domains beyond traditional physics (Bohr 1958).
- John Archibald Wheeler's "Participatory Universe" frames quantum reality as incomplete without observation, positing a cosmos in which meaning and structure emerge through observer-system interactions. Wheeler explicitly invoked the analogy between physical participation and cognitive perception, suggesting a metaphysical unity between knowing and being (Wheeler 1983).
- Carlo Rovelli's relational interpretation of quantum mechanics proposes that the properties of physical systems are not absolute but only exist relative to other systems. This relational ontology analogically challenges classical notions of objective, observer-independent reality and foregrounds the fundamental role of interaction and perspective in constituting physical facts (Rovelli 1996).
- QBism (Quantum Bayesianism) interprets quantum states as expressions of an agent's personal beliefs about measurement outcomes rather than objective features of reality. This approach analogically emphasises the participatory role of the observer in constructing knowledge, blurring traditional boundaries between

epistemology and ontology, and fostering a subjective yet consistent account of quantum phenomena (Fuchs, Mermin & Schack 2014).

These precedents support the legitimacy of using structural analogies as tools not just for communication, but for philosophical theorising.

TOWARD A UNIFIED INTERPRETATIVE FRAMEWORK

The analogical argument explored throughout this research leads us to a broader philosophical vision—one that views phenomenal consciousness not as a distinct realm separate from physical reality, but as an interwoven expression of a deeper, participatory structure of being.

At the heart of this proposal lies a reframing of the subject–object relation. Rather than treating the subject (the observer, the knower, the experiencer) and the object (the observed, the known, the measurable) as independent entities, this framework sees them as co-constituted within a dynamic process of interaction, where the meaning of each arises only through a situated perspective [Rovelli 1996; Zahavi 2005; Varela et al. 1991]. This is not to imply that subject and object exist in some abstract or indeterminate state until observation occurs; on the contrary, both possess definite states before and after measurement—this being the minimal naturalistic assumption one can reasonably make. However, their pure or precise identity and role are only fully determined in and through the act of observation/experience itself.

OPEN DISCUSSION POINTS ON THE ANALOGY’S LEGITIMACY

The analogical framework developed here—as a philosophical bridge between quantum mechanics and phenomenal

consciousness—presents a promising conceptual structure for understanding relational, participatory processes across domains traditionally considered disparate. However, as with any framework that seeks to operate at the intersection of distinct ontological and epistemic domains, further elaboration is both necessary and welcome. The following considerations are not limitations in the negative sense, but rather constructive openings—points where the analogy invites further philosophical development, interdisciplinary integration, and conceptual precision.

I. ON THE RELATION BETWEEN EPISTEMIC STRUCTURES AND ONTOLOGICAL COMMITMENTS

A central philosophical consideration concerns the status of perspectival structures. Both in quantum theory and in consciousness studies, we confront scenarios where detached, objective access is limited: the observer in quantum mechanics plays an irreducible role in the emergence of measurable outcomes; the subject in consciousness cannot be excluded from the phenomenal field it discloses.

The challenge is to determine whether these features reflect epistemic constraints—limits in how we access reality—or whether they are ontological indicators, pointing to a fundamental interdependence between being and knowing. Rather than seeing this as a problem of projection (mistaking "how we know" for "what is"), the proposed framework leans toward a non-dual reading, wherein epistemic structures are themselves expressive of ontological participation. This interpretation finds resonance in Wheeler's "participatory universe" (Wheeler 1983), Bohr's complementarity principle (Bohr 1958), and Whitehead's process metaphysics (Whitehead 1929), all of which suggest that the conditions of intelligibility are inseparable from the ontological structure of reality itself.

Carlo Rovelli's relational interpretation (Rovelli 1996) further develops this view by proposing that physical properties only exist relative to interactions between systems, dissolving the idea of absolute, observer-independent states and reinforcing the inseparability of epistemic perspectives and ontological facts. Similarly, QBism (Fuchs, Mermin & Schack 2014) emphasises the agent's participatory role in assigning meaning to quantum states, underscoring that the formalism of quantum mechanics encodes personalist knowledge rather than an objective external reality, thus bridging epistemology and ontology in a fundamentally participatory framework.

This position does not negate the importance of maintaining philosophical clarity about the boundaries of knowledge and metaphysics, but it encourages a view where epistemic and ontological dimensions are dynamically entangled, much like the very phenomena under study.

II. ON THE POTENTIAL FOR FORMALISATION THROUGH RELATIONAL AND SYSTEMIC MODELS

To move the analogy beyond heuristic value, a productive path lies in exploring formal and interdisciplinary frameworks that can model the relational and dynamic properties central to both quantum systems and conscious processes. Several existing approaches already point in this direction.

For instance, Integrated Information Theory (IIT) models consciousness as arising from irreducible patterns of causal interdependence within physical systems (Tononi 2004), offering a potential interface between informational structure and subjective presence. In parallel, quantum information theory describes entangled systems not through fixed properties but via relational correlations—a structural similarity that mirrors perspectival, non-substantialist accounts of consciousness.

Moreover, autopoietic and enactivist theories of mind provide robust models of consciousness as a self-organising, world-involving process, where cognition is not a computational function but a relational loop between organism and environment (Maturana & Varela 1980; Thompson 2007). These approaches suggest that the analogy could be systematically enriched, lending it both explanatory weight and cross-disciplinary coherence.

While these theories differ in their specific frameworks and emphases, their ongoing interaction and dialogue—centred on relationality and the perspectival co-constitution of experience—constitute a fertile ground for advancing a more integrated and coherent understanding. This convergence opens promising avenues for enriching the analogy with explanatory depth and cross-disciplinary rigour.

III. ON THE RESPECTFUL ACKNOWLEDGEMENT OF DOMANIAL DIFFERENCES

It is crucial to acknowledge the specificities of the domains involved. Quantum phenomena and consciousness differ in scale (subatomic vs. organism-level systems), ontological register (physical processes vs. experiential awareness), and processual modality (formal mathematical description vs. qualitative immediacy).

Maintaining a disciplined awareness of these differences allows the analogy to function effectively without overstepping its philosophical bounds. This involves resisting both reductionism (e.g., reducing phenomenal consciousness to quantum states) and metaphorical inflation (e.g., treating wavefunction collapse as a direct correlate of experiential unity).

Rather than seeking premature unification, the analogy is best understood as a structural and epistemic/metaphysical proposal—one that preserves the distinctiveness of each domain while highlighting their relational and participatory resonance. In this way, it functions as a philosophical lens, revealing contours of meaning

in both quantum theory and consciousness studies, without erasing their irreducible features.

CONCLUDING REFLECTION

In my view, these open points signal the philosophical maturity of the analogy, rather than its fragility. They invite further work: in clarifying the ontological and epistemic status of relationality, in exploring formal models that preserve perspectival integrity, and in engaging with disciplinary differences without abandoning the search for deeper coherence. In doing so, the analogy may continue to develop—not as a closed system or final explanation, but as a living conceptual bridge, connecting domains that together illuminate the contextual nature of reality itself.

NOTES

1. *Phenomenal consciousness* refers to the qualitative, experiential aspects of consciousness—what ‘it feels like to’. This is distinct from *higher-order consciousness*, which involves the availability of information for self-reflection, reasoning, speech, and behavioural control. While the latter is generally treated as a functional property, the former raises deeper metaphysical questions about the nature of subjectivity.
2. While quantum systems exhibit holistic and non-local correlations, the *experience* of measurement remains a localized event. Each observer registers outcomes from their own spatiotemporal standpoint. The term *non-locality* refers not to the transmission of information or experience across space, but to the statistical correlations between outcomes of measurements performed on systems that were previously entangled. These correlations cannot be accounted for by local causal mechanisms.

REFERENCES

- Bacon, Francis. 2000. *The Advancement of Learning*. Edited by Michael Kiernan. Oxford: Clarendon Press.
- Block, Ned. 1995. “On a Confusion About a Function of Consciousness.” *Behavioural and Brain Sciences* 18 (2): 227–247.

- Bohr, Niels. 1958. *Atomic Physics and Human Knowledge*. Wiley.
- Bohr, Niels. 1935. "Can Quantum-Mechanical Description of Physical Reality Be Considered Complete?" *Physical Review* 48 (8): 696–702.
- Chalmers, David J. 1996. *The Conscious Mind: In Search of a Fundamental Theory*. Oxford University Press.
- Dennett, Daniel C. 1991. *Consciousness Explained*. Little, Brown and Company.
- Foucault, Michel. 1970. *The Order of Things: An Archaeology of the Human Sciences*. New York: Vintage Books.
- Fuchs, Christopher A., N. David Mermin, and Rüdiger Schack. "An Introduction to QBism with an Application to the Locality of Quantum Mechanics." *American Journal of Physics* 82 (8): 749–754.
- Heisenberg, Werner. 1958. *Physics and Philosophy: The Revolution in Modern Science*. Harper & Brothers.
- Hesse, Mary B. 1966. *Models and Analogies in Science*. University of Notre Dame Press.
- Kant, Immanuel. 1998. *Critique of Pure Reason*. Translated and edited by Paul Guyer and Allen W. Wood. Cambridge: Cambridge University Press. (Original work published in 1781/1787.)
- Maturana, H. R., & Varela, F. J. 1980. *Autopoiesis and Cognition: The Realization of the Living*. D. Reidel Publishing Company.
- Nagel, Thomas. 1974. "What Is It Like to Be a Bat?" *The Philosophical Review* 83 (4): 435–450.
- Newton, Isaac. 1999. *The Principia: Mathematical Principles of Natural Philosophy*. Translated by I. Bernard Cohen and Anne Whitman, with the assistance of Julia Budenz. Edited by I. Bernard Cohen and Anne Whitman. Berkeley: University of California Press. Originally published in 1687.
- Rovelli, Carlo. 1996. "Relational Quantum Mechanics." *International Journal of Theoretical Physics* 35 (8): 1637–1678.
- Tononi, G. (2004). An Information Integration Theory of Consciousness. *BMC Neuroscience* 5 (42). <https://doi.org/10.1186/1471-2202-5-42>
- Varela, Francisco J. 1999. "The Specious Present: A Neurophenomenology of Time Consciousness." In *Naturalizing Phenomenology: Issues in Contemporary Phenomenology and Cognitive Science*, eds. Jean Petitot, Francisco J. Varela, Bernard Pachoud, and Jean-Michel Roy, 266–314. Stanford University Press.
- Varela, Francisco J., Evan Thompson, and Eleanor Rosch. 1991. *The Embodied Mind: Cognitive Science and Human Experience*. MIT Press.
- Wheeler, John Archibald. 1983. "Law without Law." In: *Quantum Theory and Measurement*, edited by John Archibald Wheeler and Wojciech H. Zurek, 182–213. Princeton University Press.

- Whitehead, Alfred North. 1978. *Process and Reality: An Essay in Cosmology*. Corrected edition, edited by David Ray Griffin and Donald W. Sherburne, Free Press (original work published 1929).
- Zahavi, Dan. 2005. *Subjectivity and Selfhood: Investigating the First-Person Perspective*. MIT Press.
- Thompson, E. 2007. *Mind in Life: Biology, Phenomenology, and the Sciences of Mind*. Harvard University Press.