


Nature and Consciousness: The Road Ahead After Quantum Physics

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Article Info	Abstract
<p>Article type: Research Article</p> <p>Article history: Received 11 February 2024 Received in revised from 1 March 2024 Accepted 30 March 2024 Published online 05 April 2024</p> <p>Keywords: Consciousness, quantum physics, holomovement, implicate orders, panpsychism, artificial intelligence</p>	<p>This paper explores consciousness and nature in light of recent developments in science, particularly quantum physics. Building on unresolved paradigmatic issues in quantum theory over the past century, it elaborates on the proposals of David Bohm and Roger Penrose regarding the quantum basis of consciousness. The paper argues for the necessity of liberating science from the confines of logico-positivism. A new, more robust and open foundation is needed—one that allows for the scientific exploration of the idea that the physical universe may itself possess consciousness, as suggested by quantum physics within a reimagined philosophy of science. Additionally, the paper highlights how the Qur'an and its interpretations suggest that nature is inherently alive and conscious. In this context, the Qur'anic worldview may serve as a fresh source of insight, enriching and guiding future developments in the study of consciousness and quantum physics.</p>
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1. Background and Historical Perspective

In the last century, perhaps quantum physics has been one of the most successful scientific theories. What we mean by success here is success in predicting and explaining various natural phenomena scientifically, and on the other hand also success in several practical applications that have direct use in people's lives.

In terms of scientific predictions, quantum physics has been remarkably successful in modeling the behavior of atoms, laying the foundation for our understanding of the microscopic world. From the invention of the high boson to the operation of the Large Hadron Collider (LHC), quantum principles underpin much of modern particle physics and many other areas of science. This profound impact extends across diverse scientific fields. It provides foundational understanding across the atomic structure, as evidenced by the Bohr model and Schrödinger equation's accurate predictions of atom energy levels.

Quantum mechanics also validated the Standard Model's prediction of the Higgs boson, a discovery confirmed by the LHC in 2012. It further describes electromagnetic interactions through Quantum Electrodynamics, predicting phenomena like the Lamb shift. Quantum mechanics is essential in Quantum Chemistry for modeling chemical bonding using methods like density functional theory and plays a crucial role in Nuclear Physics for understanding atomic nuclei behaviors and interactions. Additionally, Condensed Matter Physics, explains phenomena like superconductivity and magnetism, driving materials science research. Quantum optics explores quantum-level light-matter interactions, while Quantum Information Science delves into quantum computing and cryptography, leveraging quantum phenomena like superposition and entanglement. Moreover, quantum physics informs Astrophysics, from early universe quantum fluctuations to black hole behaviors, and plays a vital role in Medical Physics, supporting non-invasive imaging techniques such as MRI and PET.

Meanwhile, in terms of practical application, despite its abstract and often perplexing nature, quantum physics has led to numerous successful applications and predictions that have revolutionized various fields. For instance, quantum computing harnesses qubits to achieve exponential computational speed-ups, as seen in algorithms like Shor's and Grover's. This innovation is complemented by quantum cryptography, which employs principles such as quantum key distribution to ensure unbreakable data security. Quantum teleportation, relying on entanglement, transfers quantum information.

Moreover, quantum sensing and imaging technologies, including atomic clocks and quantum radar, find utility in navigation and surveillance. Quantum simulators and metrology offer insights into complex systems and enhance measurement precision beyond classical methods. The concept of entanglement also underpins quantum information tasks from cryptography to error correction. Quantum biology explores quantum effects in biological processes like photosynthesis, paving the way for innovations in medicine and energy production. Quantum materials like

superconductors hold promise in electronics and quantum computing. Additionally, devices like quantum memories are fundamental to advancing quantum technologies. Lastly, quantum physics informs cosmology; the pursuit of quantum gravity promises insights into phenomena like black holes and the Big Bang, potentially reshaping our cosmic understanding.

These examples illustrate the breadth of applications and predictions stemming from quantum physics, spanning from fundamental research to practical technologies with transformative potential across various domains. As our understanding of quantum mechanics deepens and technological advancements continue, the impact of quantum physics on society is expected to grow exponentially.

Along with the astonishing success of quantum physics both theoretically and practically, since the birth and development of quantum physics from the beginning, quantum physics has brought several paradoxes and major challenges to scientific methods, philosophy of science, and the development of human knowledge at large. The paradigmatic upheaval of the scientific method and philosophy of science due to the emergence and success of quantum physics has never been experienced in other scientific discoveries in the last three hundred years. It is even worth suspecting that this paradigmatic shake-up may be equivalent to the paradigm shift brought about by the sequel to the discoveries of Copernicus, Galileo, and Kepler which were perfected by Sir Isaac Newton's *Principia*.

If we study the history of the development of quantum physics, it is clear that quantum physics was born from a tradition of rigorous, experiment-based scientific methods that started with findings related to black body radiation which were well explained by Max Planck with the concept of quanta which earned him the Nobel Prize (1918), the photoelectric effect which earned Einstein the Nobel Prize (1921), model quantum atoms which earned Niels Henrik David Bohr the Nobel prize (1922), Stern and Gerlach's spin quantization, Louis de Broglie's matter-wave hypothesis of Louis Victor Pierre Raymond, 7th Duc de Broglie (The Noble Prize Winner in Physics, 1929), uncertainty principle of Heisenberg (The Nobel Prize Winner in Physics, 1932), and the discovery of quantum wave equation of Schrodinger (The Nobel Prize Winner in Physics, 1933).

Even though it developed in a strict logico-empirical methodology, quantum physics since its initial series of discoveries has directly hit the foundations of logico-positivist methodology and philosophy.

Niels-Bohr, Heisenberg, and others tried to overcome this about a hundred years ago by proposing the Copenhagen interpretation. The Copenhagen Interpretation attempts to weave the findings of quantum physics into an integrated quantum physics methodology, and in fact, this interpretation contains various major challenges to the paradigm of physics and science. Until the

end of his life, for example, one of the founders of quantum physics and the greatest physicist of the 20th century, Albert Einstein, did not agree with the Copenhagen interpretation.

While the Copenhagen interpretation lacks a definitive statement, several key ideas characterize it widely. A system's complete description relies on a quantum state, as proposed by Heisenberg, and its temporal changes are governed by the Schrödinger equation, which imparts wave characteristics to both light and matter. Atomic interactions are deemed discontinuous, rooted in Planck's quantum of action. Nature's description is fundamentally probabilistic, with event probabilities linked to the square of the wave function's amplitude, a concept introduced by Max Born known as the Born rule.

Heisenberg's uncertainty principle posits that incompatible pairs of properties cannot be simultaneously known. Additionally, both matter and light exhibit a wave-particle duality, demonstrated by experiments highlighting either particle-like or wave-like properties, but not both simultaneously, encapsulating Bohr's complementarity principle.¹ Classical measuring devices measure classical properties like position and momentum, and for large systems, quantum mechanics should approximate classical descriptions, a principle coined by Bohr and Heisenberg known as the correspondence principle.

Classical measuring devices measure classical properties like position and momentum, and for large systems, quantum mechanics should approximate classical descriptions, a principle coined by Bohr and Heisenberg known as the correspondence principle.

Einstein did not believe in the Copenhagen interpretation and rejected it. Not all scientists to date accept the Copenhagen interpretation. There are at least a dozen interpretations of quantum mechanics. Some of them are, Copenhagen interpretation, ensemble interpretation, De Broglie Bohm pilot wave interpretation, multiple worlds interpretation, and quantum information interpretation², Frida Trotter (2021) in her doctoral dissertation said that the current state of quantum interpretation can be considered a stalemate, or simply a dead end. In this condition, every new attempt to provide an interpretation that is expected to be a solution may actually add to the complexity of the impasse of this quantum interpretation problem. Without a breakthrough in fundamental matters, namely in particular one that can provide a more precise way forward, then this stalemate may not have a way out in the near future.³

¹ Niels Bohr, "The Quantum Postulate and the Recent Development of Atomic Theory," *Nature* 121, no. 3050 (1928): 580–590, <https://doi.org/10.1038/121580a0>. Also available in *Atomic Theory and the Description of Nature* (Cambridge: Cambridge University Press, 1934).

² Michele Caponigro, *Interpretations of Quantum Mechanics: A Critical Survey* (Foundation Quantum Mechanics, 2008)

³ Frida Trontter, *A Philosophical Study of Observation in Quantum Mechanics* (PhD diss., Université de Lausanne, Faculté des Lettres, 2021).

2. Quantum Physics and Consciousness

In the previous section, we explained the amazing success of quantum physics both in terms of its theoretical predictions and in terms of its applications, and also the history of the paradigm shake-up of the logico-positivism philosophy of science due to quantum physics and its implications. One of the most confusing areas for scientists working within the framework of logico-positivism which assumes a separation between matter and mind, subject and object, is the reality of the physical universe of consciousness indicated in quantum physics. Some aspects of quantum physics that indicate and lead to the reality of the existence of some form of consciousness in the physical universe are as follows:

- 1) Superposition: One of the most striking facts in quantum physics is the phenomenon of superposition, where particles can exist in multiple states simultaneously. For example, a particle could be in both an "up" and "down" spin state at the same time. This raises questions about how physical entities like particles can take on multiple states at once.
- 2) Interference: The concept of interference in quantum physics describes how particle waves, such as electrons, can influence each other. This prompts questions about whether these particles "know" about each other's existence and how they respond to each other's presence.
- 3) Measurement Effect: In quantum physics experiments, measurement actions often affect the experimental outcomes in non-intuitive ways. For instance, measurements can "force" particles to choose one of several possible states. This raises questions about how the interaction between the observer and the observed system affects the experimental outcomes.
- 4) Particle Entanglement: Quantum physics also indicates that quantum-entangled particles remain connected to each other even when physically separated. This raises questions about whether there's a deeper relationship between these particles that transcends our understanding of space and time.
- 5) EPR Paradox: In EPR (Einstein-Podolsky-Rosen) experiments, it has been found that if two quantum-entangled particles are separated and the properties of one particle are measured, the properties of the other particle seem to be "determined" instantly, regardless of the distance separating them. This raises questions about how information can be exchanged rapidly between entangled particles.
- 6) Doubling of Photographic Reality: Quantum physics concepts also challenge the idea that the physical world has an existence independent of the observer. For example, in the doubling of photographic reality experiment, particles can exhibit different behaviors depending on whether there's an observer present or not.

- 7) **Multiverse Branching:** The many-worlds interpretation in quantum physics suggests that every possible choice or decision leads to the formation of different realities. This raises questions about whether consciousness is involved in the selection process that leads to different branches of reality.
- 8) **Observer's Role:** The concept of how the observer's role in quantum physics can influence experimental outcomes has inspired several interpretations, including the anthropic interpretation, which states that the observer's existence is key to the existence and nature of the universe.
- 9) **Mind-Reality Relationship:** Some philosophers and physicists have hypothesized that consciousness or mind may play a role in shaping physical reality, especially considering how quantum physics experiments sometimes lead to results seemingly influenced by the observer.
- 10) **Holistic Concept:** Overall, the empirical facts in quantum physics suggest to us that the universe may be much more complex than we previously imagined, and they urge us to consider concepts such as consciousness as integral parts of our understanding of the universe.

While interpretations of whether the physical world possesses consciousness remain a subject of intense debate, the facts in quantum physics have opened the door to deep philosophical reflections on the fundamental nature of reality. Among these is whether the physical universe actually has some form of consciousness.

3. David Bohm's Holomovement and Implicate Order

David Joseph Bohm was one of the most significant theoretical physicists of the 20th century. Although he was not directly involved in the Manhattan Project, the calculation of Uranium enrichment in the first atomic bomb utilized a calculation method developed by Bohm. Even though he was not directly involved in the Manhattan Project, the calculation of Uranium enrichment in the first atomic bomb used a calculation method developed by Bohm. Bohm contributed innovative concepts to quantum theory, neuropsychology, and philosophy of mind. One of his notable contributions to physics is the deterministic and causal interpretation of quantum mechanics, often referred to as the De Broglie-Bohm theory.

Bohm challenged the notion that quantum physics supported the traditional Cartesian dualistic view of reality, which posits two distinct substances, mental and physical, interacting with each other. He believed this understanding of reality was overly restrictive.

Bohm introduced a mathematical and physical theory of implicate and explicate orders as an alternative to the traditional Cartesian view of reality. He suggested that the brain operates at the cellular level based on quantum mechanics and theorized that thought processes are distributed

and not confined to specific locations, similar to quantum entities. Bohm was primarily interested in grasping the nature of reality and consciousness as an integrated and ever-evolving entity, which he believed to be dynamic and never fully static or complete.

Bohm proposed that the physical universe possesses consciousness. His perspective is rooted in his interpretation of quantum mechanics, particularly his theory of the "Implicate Order" and "holomovement."

Bohm proposed that at the most fundamental level of reality, there exists an underlying implicate order, which contains the potentiality for all things to manifest. Within this implicate order, everything is interconnected and enfolded into a unified whole. This stands in contrast to the explicate order, which is the realm of everyday experience where things appear separate and distinct.

According to Bohm, consciousness is not just a product of the physical brain, but rather an intrinsic aspect of the entire universe. He suggested that consciousness is enfolded within the implicate order and manifests itself through the holomovement. What is holomovement? Holomovement is the dynamic process of unfolding and enfolding within the implicate order.

In Bohm's view, quantum phenomena such as non-locality and the observer effect point towards the interconnectedness of all things and the fundamental role of consciousness in shaping reality. He proposed that the universe is not merely a collection of separate objects governed by deterministic laws, but rather a dynamic and interconnected whole in which consciousness plays a fundamental role.

Overall, Bohm's perspective suggests that consciousness is not something separate from the physical universe but is instead an inherent aspect of it, intimately intertwined with the fabric of reality as described by quantum mechanics.

Furthermore, Bohm's proposals introduce ontological concepts for quantum theory, offering various frameworks to understand the same phenomena or aspects of reality. These concepts were specifically crafted to elucidate the peculiar behaviors of subatomic particles. While quantum physics accurately describes and predicts these behaviors, it often grapples with providing explanations for them ¹.

In "Wholeness and the Implicate Order," Bohm employed these concepts to illustrate that the appearance of such phenomena can vary and be characterized by different key factors depending on contextual factors like scales, ² The implicate, or "enfolded," order represents a deeper and

¹ David Bohm, *On Dialogue* (New York: Routledge, 2004), 114.

² David Bohm, *Wholeness and the Implicate Order* (London: Routledge, 1980).

more foundational reality, while the explicate, or "unfolded," order comprises the abstractions that humans typically perceive. As he wrote:

In the enfolded [or implicate] order, space and time are no longer the dominant factors determining the relationships of dependence or independence of different elements. Rather, an entirely different sort of basic connection of elements is possible, from which our ordinary notions of space and time, along with those of separately existent material particles, are abstracted as forms derived from the deeper order. These ordinary notions in fact appear in what is called the "explicate" or "unfolded" order, which is a special and distinguished form contained within the general totality of all the implicate orders.¹

The concept of implicate and explicate orders highlights the importance of structure and process over individual entities. These entities are viewed as mere approximations of a deeper underlying process. In this perspective, quantum particles and other objects are considered to possess limited stability and autonomy.²

Bohm posited that the peculiar behavior of quantum particles stems from unseen forces, suggesting that space and time could originate from an even deeper level of objective reality. As F. David Peat put it, Bohm believed that our perceived reality consists of "surface phenomena, explicate forms that have temporarily unfolded from an underlying implicate order." Thus, the implicate order serves as the foundational basis from which reality manifests.³

In introducing his concept of order, Bohm directly challenged several foundational principles he deemed central to much of scientific thought. He contested the belief that phenomena can be reduced to basic particles or unchanging entities, whether they be separate events in spacetime or quantum states. Additionally, he questioned the predominant focus on mathematically predicting statistical aggregates of particles. Bohm also critiqued the notion that any analysis of reality could have unlimited relevance, the idea that Cartesian coordinates represent the deepest understanding of order, and the perceived distinction between reality and thought, or between the observer and the observed. Lastly, he disputed the possibility of formulating a comprehensive Theory of Everything.

Bohm's ideas have often faced criticism based on these established principles. His approach stands in opposition to reductionism, leading some to see it as a form of ontological holism. Bohm observed that many physicists hold a belief in the universe being made up of distinct, unchangeable 'elementary particles' as its foundational building blocks. This prevailing

¹ David Bohm, *Wholeness and the Implicate Order*, XV.

² P. Pyllkkänen, B. J. Hiley, and I. Pättiniemi, "Bohm's Approach and Individuality," arXiv:1405.4772v3, version 3, November 28, 2014.

³ F. David Peat, "Non-locality in Nature and Cognition," 297–311, in *Nature, Cognition and System II: Current Systems-Scientific Research on Natural and Cognitive Systems Volume 2: On Complementarity and Beyond*, ed. M. E. Carvallo (Dordrecht: Springer Science & Business Media, 2013), 304.

perspective often assumes that these particles, or yet-to-be-discovered entities, will eventually provide a comprehensive explanation for everything.¹

Bohm emphasizes the importance of the undivided whole and the implicated order within it, rather than focusing solely on individual elements like particles or quantum states. This comprehensive perspective includes all aspects, from stable structures to processes that undergo transformation. While parts can be physical entities like atoms or even abstract concepts like quantum states, Bohm sees them as interconnected within the larger whole. He described this interconnectedness as "Undivided Wholeness in Flowing Movement," suggesting that continuous flow is fundamental, preceding the formation and dissolution of visible entities within it. Bohm likened this interconnectedness to vortex patterns in flowing water, which, despite appearing as distinct patterns, are part of a continuous flow without clear boundaries. This perspective leads Bohm to describe the entire system as the "holomovement," indicating the continuous movement of the whole².

4. Penrose Theory on Consciousness

Sir Roger Penrose is a British mathematician, mathematical physicist, philosopher of science, and Nobel Laureate in Physics. Penrose has contributed to the mathematical physics of general relativity and cosmology. He has received several prizes and awards, including the 1988 Wolf Prize in Physics, which he shared with Stephen Hawking for the Penrose–Hawking singularity theorems, and the 2020 Nobel Prize in Physics "for the discovery that black hole formation is a robust prediction of the general theory of relativity".

Before we discuss how consciousness is according to one of the greatest advanced physicists, Stephen Hawking's colleague, I would like to quote several statements from Penrose which can make it easier for us to understand how consciousness spreads throughout the universe according to Penrose. In the 1991 film "A Brief History of Time," Penrose expressed his belief that the universe has a purpose, rejecting the notion that it exists merely by chance or operates like a mechanical computation where we find ourselves by accident. He felt that this perspective was shallow and unhelpful, emphasizing instead that the universe holds deeper meaning and purpose.³

In a later interview on Premier Christian Radio, Penrose identified three profound mysteries that science has yet to unravel: the precision of mathematical equations guiding the physical world, the emergence of conscious experience from these circumstances, and our ability to use

¹ David Bohm, *Wholeness and the Implicate Order*, 173.

² David Bohm, *Wholeness and the Implicate Order*

³ *A Brief History of Time* (1991) film script, archived at the Wayback Machine, September 24, 2015, springfieldspringfield.co.uk.

consciousness to understand complex mathematics and profound ideas that often seem distant from our everyday experiences.

Penrose's two statements imply that he saw the need for a deeper reality than what appears and appears in this physical realm which has consciousness and nobility or intellectual greatness so that the physical realm is mathematical and at the same time human intellect and abilities are also able to understand mathematics. which is very elegant and very far from human experiences in the material realm. It is interesting to note here that there is a kind of parallelism between Penrose's views and Sir Isaac Newton's arguments for the existence and singleness of God that Newton put forward in his magnum opus, the *Principia*. Sir Isaac Newton's magnum opus explains that ontologically the physical universe is mathematical, and in this book, Sir Isaac Newton wrote "This most beautiful system of the sun, planets, and comets, could only proceed from the counsel and dominion of an intelligent Being. This Being governs all things, not as the soul of the world, but as Lord over all; and on account of his dominion he is wont to be called "Lord God" παντοκράτωρ [pantokratōr], or "Universal Ruler". The Supreme God is a Being eternal, infinite, [and] absolutely perfect."¹

Now, we come to the position of explaining how consciousness arises throughout the physical universe according to Sir Roger Penrose.

In 1931, mathematician and logician Kurt Gödel demonstrated that any theory capable of proving basic arithmetic must either be inconsistent or incomplete. Essentially, a mathematically rigorous theory cannot prove its own consistency². However, in his 1989 book on consciousness, "The Emperor's New Mind," Roger Penrose contended that even though Gödel-unprovable results can't be proven within a system by the system itself, human mathematicians can indeed prove them.³

He interprets this difference to suggest that human mathematicians can't be defined solely as formal proof systems, implying they operate using a non-computable algorithm.

If the Penrose-Lucas argument holds, it challenges the idea that all physical systems and laws are computable and algorithmic. Penrose suggested that the collapse of the wave function could be a non-computable process. In quantum mechanics, particles differ from classical objects, being

¹ Sir Isaac Newton, *Principia*, Book III, cited in *Newton's Philosophy of Nature: Selections from His Writings*, ed. H. S. Thayer (New York: Hafner Library of Classics, 1953), 42.

² Douglas Hofstadter, *Gödel, Escher, Bach: An Eternal Golden Braid* (New York: Basic Books, 1979), 476–477; Bertrand Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach* (Upper Saddle River, NJ: Prentice Hall, 2003), 950; Alan Turing, *Computing Machinery and Intelligence* (1950), under "The Argument from Mathematics," where he writes, "Although it is established that there are limitations to the powers of any particular machine, it has only been stated, without sort of proof, that no such limitations apply to the human intellect."

³ Roger Penrose, *The Emperor's New Mind: Concerning Computers, Minds and the Laws of Physics* (Oxford: Oxford University Press, 1989), 480.

described by wave functions governed by the Schrödinger equation. These wave functions can be combinations of system eigenstates due to the superposition principle. When a quantum system interacts with a classical one, such as during measurement, it seems to collapse to a definite state from a classical perspective.

If this collapse is genuinely random, its outcome can't be predicted deterministically by any process or algorithm. Penrose saw this unpredictability as a possible physical basis for non-computable processes in the brain. However, he wasn't satisfied with the random nature of the collapse caused by environmental factors, as randomness isn't conducive to mathematical understanding. Instead, Penrose proposed that isolated systems could experience a different kind of collapse, which he termed "objective reduction" (OR)¹.

Penrose aimed to harmonize general relativity and quantum theory through his unique insights into the potential structure of spacetime². He suggested that at the Planck scale curved spacetime is not continuous, but discrete. In Penrose's theory, the states chosen during objective reduction aren't determined randomly like in wave function collapse, nor are they governed by an algorithm. Instead, these states are influenced by a "non-computable" factor inherent in the Planck scale of spacetime geometry. Penrose posited that this information is rooted in Platonic ideals, representing pure mathematical truths. This aligns with his concepts of the three worlds: the physical, the mental, and the Platonic mathematical realm. In "Shadows of the Mind" (1994), Penrose hints that this Platonic realm might also encompass aesthetic and ethical values, though he doesn't fully endorse this extended hypothesis³.

It is an intriguing question, what is meant by Penrose's Platonic ideas the same or different from the Platonic forms believed by some philosophers? If different, what is the relationship? Of course, this will be an interesting subject for further research. However, one thing that is certain is that, like Bohm, Penrose has challenged and falsified the Cartesian approach in the method and philosophy of logico positivism and invited and encouraged science to move further to the recognition that the physical universe basically also has life and aspects that are not only limited to sensory things but also intellectual, spiritual and ethical.

5. Panpsychism And Science

The idea that nature, including the physical world, has consciousness is actually not something foreign to the world of science. From a certain point of view, science can be seen as a form of

¹ Stuart Hameroff and Roger Penrose, "Consciousness in the Universe," *Physics of Life Reviews* 11, no. 1 (2014): 39–78, <https://doi.org/10.1016/j.plrev.2013.08.002>.

² Roger Penrose, *The Emperor's New Mind: Concerning Computers, Minds and the Laws of Physics* & Roger Penrose, *Shadows of the Mind: A Search for the Missing Science of Consciousness* (Oxford: Oxford University Press, 1989), 416–417, 457.

³ Ibid

continuous progression of human knowledge achievements. And actually, following Thomas Kuhn, science can never be separated from a set of ways of looking at the world, which is called a paradigm. Paradigms are things that are logical, and philosophical, and underlie the empirical nature of science.

The paradigm or view that nature has consciousness is called panpsychics. Just as a scientist may take logico-positivism as his way of seeing the world, a scientist may also take panpsychics, - which contradicts in many fundamental ways with logico-positivism -, as his way of seeing the world.

The concept of panpsychism has been around for more than two thousand of years. Plato said that the world is indeed a living being endowed with a soul and intelligence. The astronomer, mathematician, and pre-Socratic philosopher Thales said: “Everything is full of gods”. The terminology comes from $\pi\alpha\nu$ (pronounced “pan” and meaning everything) and $\psi\upsilon\chi\eta$ (psyche, soul, or mind) to make mention of a distinctive soulfulness inherent to each and every order of creation.¹

Panpsychism is supported by many thinkers and scientists. Among them are Spinoza, Leibniz, Arthur Schopenhauer, William James, Alfred North Whitehead, Bertrand Russell, and Galen Strawson. In the 1800s to 1900s, panpsychism was the mainstream paradigm among thinkers and scientists. The logico-positivism movement that began with the Vienna Circle in the 1920s caused the influence of the panpsychism paradigm to decline. According to logico-positivism the idea that scientific knowledge—empirically proven knowledge—was the only kind of acceptable knowledge—the rest being metaphysical mumbo-jumbo. It was game over for panpsychism.

The success of logico positivism did not last long. Too many absurdities are raised by logico positivism's rejection of metaphysics and everything that cannot be observed with the senses. Karl Popper, in the *Logic of Scientific Discovery*, for example, wrote that the extraordinary enthusiasm for eradicating metaphysics as a whole would affect science as a whole. The insistence of the logico positivism paradigm to eradicate everything that indicates that there is a nature other than the physical world that has undeniable ontological power has really become an obstacle for scientists to understand the amazing aspects of quantum physics and the hard problems of consciousness.

In recent decades, there's been a resurgence of interest among scientists in moving away from the logical positivism paradigm and towards a pan-physical view of the world. This shift is evident in the work of scientists like David Bohm and Roger Penrose, who explored the relationship between consciousness and quantum physics. Alongside them, in 2004, Italian neuroscientist and psychiatrist Giulio Tononi introduced the integrated information theory of consciousness. This

¹ Lee Irwin, *A World Full of Gods: Panpsychism and the Paradigms of Esotericism* (Publisher, 2014).

theory posits that consciousness is not limited to complex systems but can also be found in simpler ones¹.

Ten years later, prominent American neuroscientist Christof Koch challenged materialism's perspective on the emergence of consciousness in an article published in *Scientific American*²

Koch criticized the idea that subjective feelings could arise purely from physical matter, countering with the philosophical axiom "ex nihilo nihil fit," which translates to "out of nothing, nothing comes." He contended that if elementary particles possess some form of charge, or lack thereof, and consciousness emerges from organized matter, then even the smallest components of nature should harbor consciousness.

Furthering this exploration is the perspective of renowned biologist and author Rupert Sheldrake. Sheldrake posits that consciousness isn't exclusive to humans but extends throughout the cosmos, suggesting that even the galaxy possesses consciousness. His well-known concept, morphic resonance, proposes that self-organizing systems, like termite colonies or insulin molecules, inherit memories from similar past systems. This theory also accounts for what many perceive as telepathic connections among species and shared collective memories. Sheldrake has delved into intriguing questions, such as whether the Sun possesses consciousness. In a 2021 paper published in the *Journal of Consciousness Studies*, he firmly argues that it does³.

In an interview with *Popular Mechanics*, Sheldrake elaborated on his views, stating that consciousness isn't limited to brains alone. He believes that rhythmic electromagnetic fields, present both in human brains and around celestial bodies like the Sun, serve as a conduit for information between minds and physical systems. According to Sheldrake, if the Sun is conscious, it might be attuned to events within our solar system, including Earth, as well as its interactions with other stars and the broader galaxy⁴.

6. Artificial Intelligence and Consciousness

One of the current issues that is being discussed a lot by scientists and philosophers is whether Artificial Intelligence can have consciousness. Before we proceed further into the discussion, it would be interesting for us to see the results of a survey regarding what most people think about this matter. A recent informal poll conducted by Casper Wilstrup, CEO of Abzu, revealed that a

¹ Giulio Tononi and Christof Koch, "Consciousness: Here, There and Everywhere?" *Philosophical Transactions of the Royal Society B: Biological Sciences* 370, no. 1668 (2015): 20140167, <https://doi.org/10.1098/rstb.2014.0167>.

² Christof Koch, "Ubiquitous Minds," *Scientific American Mind* 25, no. 1 (2013): 26–29, <https://doi.org/10.1038/scientificamericanmind0114-26>.

³ Rupert Sheldrake, "Is the Sun Conscious?" *Journal of Consciousness Studies* (2021).

⁴ S. Dimitropoulos, "Everything in Our Universe—Even the Chair You're Sitting On—May Be Conscious, Scientists Say," *Popular Mechanics*, March 22, 2024, <https://www.popularmechanics.com/science/a60229168/panpsychism-everything-has-a-soul/>.

majority (68%) of respondents believe AI systems are either already conscious or will soon attain consciousness. This perspective challenges traditional views and prompts us to consider the implications of this impending evolution of AI ¹.

In fact, that Artificial Intelligence may have consciousness becomes a major problem once again within the framework of the logico-positivism paradigm. Meanwhile, within the framework of panphysics or the interpretation of quantum physics and consciousness in the style of Bohm and Penrose as well as the interpretation of the famous biologist Sheldrake, it is not strange, and Artificial Intelligence may have consciousness, just as nature and the universe have consciousness.

However, this issue is complicated and will become a long debate if discussed within the framework of the logico-positivistic paradigm. In this framework, one theory of the emergence of consciousness in Artificial Intelligence is the theory of evolutionary consciousness. Adherents of this theory believe that the development of Artificial Intelligence is a continuation of the theory of evolution. What gives rise to awareness is complexity. Of course, this is also not a solid view when viewed from Koch's argument that the "ex nihilo nihil fit," or that "out of nothing, nothing comes".

Furthermore, because the logico-positivist view from the start views nature as not having consciousness, the emergence of consciousness in Artificial Intelligence is seen by some people as a threat and its emergence is considered to have the potential to cause serious ethical problems. Some argue that creating a conscious entity is unnatural and potentially dangerous. However, the problem will be different under the view that all nature, including Artificial Intelligence, has consciousness. The existence of consciousness in Artificial Intelligence is not something very new, so with some regulations, it may not be very harmful and disastrous for humankind and humanity.

The types and levels of consciousness that exist in Artificial Intelligence may include various types and levels of consciousness that exist in nature. This will certainly require further careful scientific research. And of course, the ethical problems that can arise should be anticipated before they have widespread negative effects.

The level and type of consciousness that Artificial Intelligence may have as an accumulation and result of computational abilities and algorithms supported by high data processing speed and power was also discussed specifically by Roger Penrose. For Penrose, no matter how powerful things are, the results of computational algorithms are not real consciousness. For Penrose, quantum waves and quantum mechanics exist in a universe that is still mathematical. However, one thing that cannot be explained mathematically is the phenomenon of quantum wave collapse,

¹ C. S. Wilstrup, "The Implications of Conscious AI: A Leap Into the Unknown," *Machine Consciousness*, June 6, 2023, <https://medium.com/machine-cognition/the-implications-of-conscious-ai-a-leap-into-the-unknown-f666f842aad9>.

which is the door to real consciousness. It is an interesting and truly challenging open scientific problem to research further the levels of Artificial Intelligence consciousness following Roger Penrose's line of ideas.

7. Nature And Consciousness in The Quran

In this section, we will discuss how the Qur'an and Islam view nature and consciousness. However, before such a discussion, it is necessary to reflect on some important ideas of Islamic thinkers on this matter. This is primarily because the relationship between religion and science is an important and unique relationship. Placing our interpretation of religion absolutely to regulate the development of science does not seem to be a wise thing. History shows that the relationship between the Church in Europe and the development of science in the pre-Renaissance era is not a relationship between religion and science that is worth repeating. Aristotelian interpretations of religion have been used to limit and persecute scientists as in the famous case of Galileo Galilei. In turn, this has backfired tremendously. Scientists supported by thinkers and philosophers are looking for a way out. So, in the last few years, there has been a wave of science, as well as people and scientific communities who believe in science and tend to be anti-, dwarf, and marginalize religion. It is very possible that the modern wave of atheism emerged as a continuation of the resistance of the free search for scientific truth to the oppression of "Religion".

Ayatullah Morteza Muthahhari in a long and comprehensive discussion on this matter. A safe position for "Religion" in relation to science is a position of independence. What we mean by "Religion" in quotation marks here is our interpretation of Religion. No one can claim absolute understanding of religion except God himself who revealed religion and the holy people sent by God (peace be on them).

For example, whether the theory of abiogenesis is correct or the theory of biogenesis is correct, neither of which contradicts the truth of Tawhid, the metaphysical view of creation according to Islam, and does not contradict "Religion". Also, whether Charles Darwin's theory of evolution is true or not. Also, whether Stephen Hawking's Big Bang theory is true or not. Syahid Muthahhari explains it rationally and philosophically with a comprehensive explanation¹.

In line with and complementing Syahid Muthahhari's explanation regarding the relationship between religion and science, the leading Muslim intellectual from Indonesia, the late Jalaluddin Rakhmat, was of the view that we must always prioritize critical thinking and not get caught up in things such as interpreting the Quran and absolute religious truths in a way that scientific findings and truths that are relative.

¹ [20] Mutadha Muthahhari, *Seri Pemikiran Muthahhari, Vol. 5: Ruh, Materi dan Kehidupan* (Bandung: Yayasan Muthahhari, 1993).

Jalaluddin Rakhmat wrote about the work of Dr. Maurice Bucaille, *La Bible, la Coran, et la Science*.

“Many Muslims were entertained by Bucaille's book and accepted the scientific interpretation he put forward. The Qur'an is not only seen as being able to talk about heaven and hell but also about the latest scientific discoveries. The verses of the Qur'an seem to have a new meaning that is truly in accordance with modern scientific data. Bucaille's popularity has eclipsed scientific commentators such as Fakhrurrazi, al-Baidawi, al-Nisaburi, or Tantawi Jawhari.

Bucaille not only provided a new interpretation, he also criticized translators of the Qur'an, who made mistakes in interpreting verses of the Qur'an. “They are generally literary people,” said Bucaille. “Often they mistranslate verses, lacking the scientific knowledge necessary to understand their true meaning. The reason is that to be able to translate correctly, people must first understand what they read. Another reason is that the translators—especially those I mentioned above—may have been influenced by the comments of classical commentators who explained the verse. Due to tradition, these commentators were often considered highly authoritative, even though they lacked the scientific knowledge of their contemporaries. They are unable to imagine that these verses might indicate worldly knowledge, so they devote attention to a particular verse and compare it with other verses that deal with the same thing- a process that provides the key to understanding the meaning of a word or expression. This is where the reality arises that the verses of the Qur'an that can be related to modern knowledge are most likely translated incorrectly. Very often, the translations are filled with imprecise—if not downright frivolous—statements. The only way to avoid this mistake is to have a scientific background and study the Qur'an in its original language.

However, is it true that unscientific interpretations are wrong? Should we abandon classical commentators such as Ibn Abbas, Ibn Kathir, Al-Tabari, Jalaluddin al-Suyuti, or Al-Shawkani, because they have no scientific background? Not everyone agrees with Bucaille. Many scholars—even scientists, such as Ziauddin Sardar—criticized efforts to scientificize the verses of the Qur'an.... It often happens that these scientific commentators know about a scientific theory, and then look for verses in the Qur'an that support that theory. As a result, what happens is not that science interprets the Qur'an, but the Qur'an interprets science. What is even more dangerous is interpreting Al-Qur'an verses with scientific theories that are still speculative. When scientific theories collapse, the verses of the Qur'an related to them also collapse. The truth of the Qur'an is absolute, while scientific truth is relative. Doesn't scientific interpretation actually reduce the truth of the Qur'an?”¹

From the discussion of Syahid Muthahhari and Jalaluddin Rakhmat, the discussion regarding nature and consciousness according to the Quran which we will discuss below should not be

¹ Jalaluddin Rakhmat, *Islam Alternatif* (Bandung: Mizan, 1986).

positioned to limit the spirit of freedom to search for scientific truth, nor should we be trapped in interpreting the Quran with contemporary scientific truth about nature and consciousness. is being hotly discussed by scientists. The position we recommend is how the great ideas taught by the Almighty God about nature and consciousness in the Quran can inspire and enrich the science of consciousness and nature. With this position, we still maintain the independent position of "Religion" towards science and are not trapped in Bucailism.

Nature, as described in the Quran, is portrayed as a living and conscious entity, with its various elements expressing praise and consciousness of the Divine. This perspective, deeply rooted in Islamic teachings, underscores the interconnectedness of all creation and the inherent consciousness within the cosmos.

In numerous verses, the Quran portrays the elements of Nature—such as the skies, the earth, mountains, the sun, the moon, stars, and vegetation—as actively glorifying and praising Allah, the Creator. These verses highlight the profound spirituality and consciousness that permeate the fabric of existence.

One such verse, found in Surah Al-Hadid (57:1-2), emphasizes the sovereignty of Allah over the skies and the earth, stating:

سَبِّحَ لِلَّهِ مَا فِي السَّمَوَاتِ وَالْأَرْضِ وَهُوَ الْعَزِيزُ الْحَكِيمُ ١

“Whatever is in the heavens and the earth glorifies Allah, for He is the Almighty, All-Wise.”

لَهُ مُلْكُ السَّمَوَاتِ وَالْأَرْضِ يُحْيِي وَيُمِيتُ وَهُوَ عَلَى كُلِّ شَيْءٍ قَدِيرٌ ٢

“To Him belongs the kingdom of the heavens and the earth. He gives life and causes death. And He is Most Capable of everything.”

Similarly, Surah Al-Israa (17:44) elucidates how beings in the Nature engage in praise and glorification of Allah beyond human comprehension:

٤٤ تَسْبِيحُ لَهُ السَّمَوَاتُ السَّبْعُ وَالْأَرْضُ وَمَنْ فِيهِنَّ وَإِنْ مِنْ شَيْءٍ إِلَّا يُسَبِّحُ بِحَمْدِهِ وَلَكِنْ لَا تَفْقَهُونَ تَسْبِيحَهُمْ إِنَّهُ كَانَ حَلِيمًا غَفُورًا

“All the seven skies and the earth and all those therein extol His purity. And there is not a single thing that does not extol His purity along with His praise, but you do not understand their extolling. Surely, He is Forbearing, Most-Forgiving.”¹

Moreover, in Surah Al-Anbiya' (21:31-32), the Quran portrays the mountains as steadfast symbols of divine majesty, stating:

¹ T. Usmani translation, as cited from www.quran.com.

وَجَعَلْنَا فِي الْأَرْضِ رَوْسِي أَنْ تَمِيدَ بِهِمْ وَجَعَلْنَا فِيهَا فِجَاجًا سُبُلًا لَعَلَّهُمْ يَهْتَدُونَ ٣١

“And We have placed firm mountains upon the earth so it does not shake with them and made in it broad pathways so they may find their way.”

وَجَعَلْنَا السَّمَاءَ سَقْفًا مَحْفُوظًا وَهُمْ عَنْ آيَاتِهَا مُعْرِضُونَ ٣٢

“And We have made the sky a well-protected canopy, still they turn away from its signs.”

Additionally, Surah Luqman (31:10-11) depicts the intricate interconnectedness and consciousness within the natural world, stating:

خَلَقَ السَّمَوَاتِ بِغَيْرِ عَمَدٍ تَرَوْنَهَا وَالْأَرْضِ رَوْسِي أَنْ تَمِيدَ بِكُمْ وَبَثَّ فِيهَا مِنْ كُلِّ دَابَّةٍ وَأَنْزَلْنَا مِنَ السَّمَاءِ مَاءً فَأَنْبَتْنَا فِيهَا مِنْ كُلِّ زَوْجٍ كَرِيمٍ ١٠

“He has created the skies without the pillars that you may see, and placed mountains on the earth, lest it shakes with you, and spread over it all kinds of creatures. And We sent down water from the heavens, and caused to grow in it every noble pair.”

These verses collectively emphasize the dynamic and conscious nature of Nature, wherein every element praises and glorifies Allah in its unique way. They invite reflection on the profound spirituality inherent in creation and the recognition of Divine presence and consciousness permeating every aspect of existence.

Thus, the Quranic portrayal of Nature as a living and conscious entity underscores the interconnectedness and consciousness of all creation. Through verses highlighting the praise and consciousness expressed by elements of the cosmos, the Quran invites humanity to recognize the divine presence and consciousness inherent in the fabric of existence.

In the *Tafsir Nur al-Qur'an*, ‘Allamah Sayyed Kamal Faqih Imani mentioned about the tafsir of this ayah:

٤٤ تُسَبِّحُ لَهُ السَّمَوَاتُ السَّبْعُ وَالْأَرْضُ وَمَنْ فِيهِنَّ وَإِنْ مِنْ شَيْءٍ إِلَّا يُسَبِّحُ بِحَمْدِهِ وَلَكِنْ لَا تَفْقَهُونَ تَسْبِيحَهُمْ إِنَّهُ كَانَ حَلِيمًا غَفُورًا

“All the seven skies and the earth and all those therein extol His purity. And there is not a single thing that does not extol His purity along with His praise, but you do not understand their extolling. Surely, He is Forbearing, Most-Forgiving.”¹

He said, “This noble verse informs us that the entire cosmic order has its own way of glorifying, prostrating, and praying to Allah SWT. Some interpreters suggest that this form of glorification is

¹ Holy Al-Israa (17):44 & T. Usmani translation, as cited from www.quran.com.

inherent. It means that the structural components of every particle in this world are signs and symbols of the Divine will, wisdom, knowledge, and justice.”

Other scholars of interpretation argue that the existent world has its own consciousness and knowledge, and all beings continuously glorify it, even though our ears may not hear their voices. Further, he emphasized that this latter view is more consistent with the apparent meaning of the above verse. The vocalization of objects is not impossible, as such a process will also occur in the Hereafter:

قَالُوا أَنْطَقَنَا اللَّهُ الَّذِي أَنْطَقَ كُلَّ شَيْءٍ... ٢١

"They will say, 'Allah, who has made everything speak, has made us speak...'"¹

Even stones have consciousness and can feel fear, as they crumble from the mountains due to fear of Allah:

...وَإِنَّ مِنَ الْحِجَارَةِ لَمَا يَتَفَجَّرُ مِنْهُ الْأَنْهَارُ وَإِنَّ مِنْهَا لَمَا يَشَقَّقُ فَيَخْرُجُ مِنْهُ الْمَاءُ وَإِنَّ مِنْهَا لَمَا يَهْبِطُ مِنْ خَشْيَةِ اللَّهِ وَمَا اللَّهُ بِغَافِلٍ عَمَّا تَعْمَلُونَ ٧٤

"...For surely among the rocks there are some from which rivers gush forth, and there are others that crack open and water flows from them, and there are still others that fall down in fear of Allah. And Allah is not unaware of what you do..."²

‘Allamah Tabataba-i in Tafseer al-Mizan about this verse, wrote: “We observe how rocks, especially large ones on mountaintops, can be shattered, and then an ordinary earthquake is enough to loosen these large rocks, causing rockfalls. Also, cracks, crevices, or gaps are filled with ice and snow during the winter, after which the warmth of spring melts the ice, resulting in streams of water flowing down into valleys. This phenomenon is related to its natural causes, but Allah states that the rocks fall because of fear of Him. Why? Because all natural causes ultimately return to the First Cause, namely Allah. Rocks, when they collapse or fall due to natural causes, are actually waiting for the decree of Allah, who places them under the influence of these secondary causes. Therefore, it can be said that they understand the command of their Lord. They obey Allah's decree because they are molded in such a way by Him.”

‘Allamah Tabataba-i continued: Fear is also based on perception, just as glorification and obedience are. Therefore, it can be said that rocks fall or collapse out of fear of Allah. This statement is figurative, similar to the style of the following verses:

"And the thunder exalts [Allah] with praise of Him - and the *وَيَسْبِحُ الرَّعْدُ بِحَمْدِهِ وَالْمَلَائِكَةُ مِنْ خِيفَتِهِ* angels [as well] from fear of Him."³;

¹ Holy Quran, Fussilat: 21

² Holy Quran, Al-Baqarah: 74

³ Holy Quran, Ar-Ra'd: 13

وَلِلَّهِ يَسْجُدُ مَنْ فِي السَّمَوَاتِ وَالْأَرْضِ طَوْعًا وَكَرْهًا وَظِلَالُهُمْ بِالْغُدُوِّ وَالْآصَالِ

"And to Allah prostrates whoever is within the skies and the earth, willingly or by compulsion, and their shadows [as well] in the mornings and the afternoons."¹

Here, the sound of thunder is seen as a declaration of Allah's glorification, while their shadows are said to be prostrating to Allah. Many verses are styled similarly, all based on similar analysis as mentioned above. (However, the statement, "and indeed, there are among them those who fall down for fear of Allah," further demonstrates how the hearts of the Jews are harder than the rocks: Rocks fear Allah and fall or collapse because of fear of Him, but in the hearts of the Jews, there is no fear of Allah, they do not fear His wrath.)

Further, Allamah Sayyed Kamal Faqih Imani emphasized that all beings continuously glorify, even though our ears may not hear their voices. He mentioned that Solomon understood the language of ants and mastered the language of birds. A particular bird called the hoopoe was used to investigate and report the misconduct of some humans to Solomon. In many cases of revelation, God also speaks to the mountains. For example, He commands them to glorify David, through His saying:

... يَجِبَالُ أُوْبِي مَعَهُ وَالطَّيْرَ وَالنَّارَ لَهُ الْحَدِيدَ ١٠

"O mountains, repeat [Our] praises with him, and the birds [as well]..."²

In addition to the cases mentioned above, the Quran often refers to the glorification performed by all creatures.

*We also find in traditions that bees also glorify and praise Allah.*³

A small stone in the hand of the Prophet Muhammad once testified to the truth of his mission. (Tafsir al-Mizan)

*The loud and high-pitched voices of birds are their way of glorifying and praising Allah.*⁴

All the above traditions refer to real cases of glorification, and all of this does not include non-verbal language. A Persian poem says, "Everyone uses a different way to exalt and give thanks to You. A nightingale continues to sing sonatas, while a Qomri bird sings ordinary tunes... all the particles of this Nature speak to You day and night personally. They say, 'We all see and hear, and know even though we are silent when we are with You.'"

To prove the greatness of God and that it is not as imagined by the disbelievers, the Quran refers to the glorification of all creatures in the presence of His Exalted Being, when it says:

¹ Holy Quran, Ar-Ra'd: 15

² Holy Quran, Saba: 10

³ *Al-Bihar*, vol. 95, p. 372.

⁴ *Al-Bihar*, Vol. 64, p. 27

تُسَبِّحُ لَهُ السَّمَوَاتُ السَّبْعُ وَالْأَرْضُ وَمَنْ فِيهِنَّ وَإِنْ مِنْ شَيْءٍ إِلَّا يُسَبِّحُ بِحَمْدِهِ وَلَكِنْ لَا تَفْقَهُونَ تَسْبِيحَهُمْ إِنَّهُ كَانَ حَلِيمًا غَفُورًا ٤٤

*“All the seven skies and the earth and all those therein extol His purity. And there is not a single thing that does not extol His purity along with His praise, but you do not understand their extolling. Surely He is Forbearing, Most-Forgiving.”*¹

This vast and immense Nature, with its astonishing systems and all its secrets, along with its captivating beauty, glorifies and expresses gratitude to Him.

Nevertheless, at the same time, He is the Most Patient and the Most Forgiving, and we will not immediately be questioned about the disbelief and paganism we commit. Instead, He will grant us respite for a sufficient period while still leaving the door of repentance open for us to rectify and perfect our arguments against us. The above verse states:

*“But you do not understand their [way of] exalting. Indeed, He is ever Forbearing and Forgiving.”*²

This vast and immense Nature, with its astonishing systems and all its secrets, along with its captivating beauty, glorifies and expresses gratitude to Him.

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“But you do not understand their [way of] exalting. Indeed, He is ever Forbearing and Forgiving.” (Quran, Al-Israa: 44)

This verse reminds us of the limited understanding of human beings regarding the glorification of all creatures and emphasizes the mercy and forgiveness of Allah, who patiently grants us time to reflect and repent, despite our shortcomings and lack of comprehension.

From the discussion and discussions above, it is clear that according to the Quran, nature has consciousness. And further, therefore nature is closed. This is in accordance with the explanation of 'Allamah Sayyid Muhammad Husain Tabatabai in *Bidayah Al-Hikmah* regarding the meaning of life, "life means a conscious actor (al-darrāk al-fa'āl). Life is a source of awareness and activity, or a source of knowledge and power, or anything associated with knowledge and power"³

In the subsequent dialogue and discussion between the interpretation and understanding of the Quran's views on the nature of life and the consciousness that nature possesses and modern science's quest for the consciousness of nature, we must be very careful not to fall into the trap of confusing the truths of "Religion" and science. The position of independence of "Religion" and

¹ T. Usmani translation, as cited from www.quran.com.

² Holy Quran, Al-Israa: 44

³ Sayyid Muhammad Husein Tabatabai, *Al-Mizan fii Tafsiir Al-Qur'an* (Arabic).

science advocated by Syahid Muthahhari is complemented by avoiding interpreting the Quran whose absolute truth with science should still be taken into consideration. Rational precision regarding definitions, frameworks, and various meanings of consciousness with various criteria may be able to increase the caution of researchers so that the views of the Quran which are absolute and eternal guidance from the God of the Universe can be truly effective in inspiring the way forward for research and the scientific search for nature and consciousness.

8. Discussion And the Road Ahead

That nature, - from sub-atomic particles, and living creatures to humans and galaxies - has consciousness is a scientific truth that is being researched and pursued by scientists. Advances in quantum physics accompanied by neuroscience and psychology are pushing modern science to uncover what lies behind the mysteries of this cosmic consciousness. David Bohm, Roger Penrose, and many other scientists have tried to uncover this challenging scientific field.

The logico-positivist worldview which always tries to eradicate things that are immaterial and metaphysical from the arena of science seems to be the main obstacle to progress in this field. Science and the philosophy of science that underlies it needs to correct its paradigm and how it works, crossing over from the logico-positivism paradigm to a paradigm that is more tolerant and accommodating towards things that are immaterial and metaphysical such as panphysics to be able to reveal further reliable scientific theories about nature and consciousness.

Some of the things below might be important notes as things that can be reflected upon and perhaps, if necessary, dismantled from the current mainstream scientific research paradigm building which still has a very logico positivistic flavor in order to bring the world of science to be able to penetrate amazing new truths. about nature and consciousness.

First, science in the future must accommodate things that are not sensory. Among the things that are not sensory, but logical and can lead humans to amazing discoveries are creative imagination, abduction, and mathematics. Popper has developed sensory testing criteria in more modest settings. Instead of proving a scientific theory, things that are sensory according to Popper are used to refute a scientific theory. So, sensory matters can never produce a universal scientific theory. Philosophy of science in the future is challenged with new demarcation criteria that can accommodate extraordinary achievements in the field of theoretical physics today. Discussions about nature and consciousness, such as Bohm's theory of implicate and explicate order, inevitably involve discussions of the existence of realms outside the sensory realm. A radical a priori rejection of the possibility of the existence of these immaterial realms would certainly halt the progress of scientific research on these theories.

Second, science in the future should acknowledge more that in the scientific realm, there is no one hundred percent objectivity. As Bohm criticized the Cartesian model of reality, which is the basis for objective and subjective judgments, this model is too limited and limits the further elaboration of the scientific truths of quantum physics and consciousness. The assumption is that the separation between subject and object has fallen. It is very possible that in this case, the

paradigm of gradation of existence along with the paradigm of unity between the subject who thinks and the object which is thought by the Iranian philosopher Mulla Sadra Shirazi can be researched to become a new axiom.

Third, science should provide a balance against reductionism. As previously discussed in David Bohm's theory of consciousness, Bohm noted prevailing views among physicists that "the world is assumed to be constituted of a set of separately existent, indivisible, and unchangeable 'elementary particles', which are the fundamental 'building blocks' of the entire universe ... there seems to be an unshakable faith among physicists that either such particles or some other kind yet to be discovered, will eventually make possible a complete and coherent explanation of everything" [5]. A holistic view of the universe, as often discussed by Fritjof Capra and other thinkers, should begin to be considered in the search for a philosophical foundation for the development of a more intelligent science.

Fourth, following Feyerabend, science is a universal problem for mankind. Thus, scientists need to be more open in dialogue with many parties, scientists and non-scientists, for the advancement of science. Scientists who are in search of the truth about consciousness and nature in particular seem to need to open dialogue with another source of human knowledge about consciousness and nature. One of the most promising sources of inspiration for progressing science about consciousness is the Quran. As we showed in the previous section there are many clues and lessons that science can take from the Quran regarding the nature of consciousness of all that exists in the universe. We suspect that there will be many breakthroughs in science about nature and consciousness if these kinds of activities are carried out. In this case, we also recommend studying the work of scholars, and philosophers such as Mulla Shadra Shirazi, Muhyiddin Ibn 'Arabi, and many other figures who have researched this matter, to take lessons from them and try to build a new scientific research paradigm and more scientific theory, advanced about consciousness and nature.

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