

Materialism, Non-Materialism and the Problems of Consciousness

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Abstract

Metaphysicians have often tended to project their ethical ideals and intuitions into the ultimate structure of reality. This has led to the positing of numerous metaphysical entities whose nature is incoherent with known universal laws, and this is the usual defense made by reductionists in their approach to mind-body dualism. However, the variants between the corporeal and the incorporeal are not necessarily explicable in reductionist terms. In this paper, I will try to analyze and compare in which way consciousness is irreducible to, yet by necessity linked with its ontological physical correlates.

With the birth of quantum mechanics, a notable challenge to the traditional idea of substance as mere tangible material has arisen from the Standard Model¹ of particle physics. Within the framework of quantum theory, the elemental units (*quanta*) that constitute matter are dissimilar to objects encountered macroscopically. When sufficiently isolated from the environment *quanta* may be viewed as waves. These quantum waves (wave-functions) are essentially waves of varying probability of locating a particle at some specific position, and the peak of the wave-function indicates the location with maximum probability of a particle being found at that point² in space-time. Given that a quantum event begins at a particular point in space-time, there is a certain point in space-time where the cycle is complete, and at that point the quantum process recommences. The structure of matter therefore endures through time by virtue of the cyclic nature of the quantum events that constitute its very existence; in this way, quantum events may therefore be seen as *permanent possibilities* of macroscopic objects.

The majority of neuroscientists accept that the philosophical basis for consciousness should be explained by some form of materialism or physicalism, and classical scientific theories³ of consciousness assume that it simply emerges from a deterministic process similar to a computer that is presumed to exist in the brains of living organisms. However, quantum theory, the nature of which I have briefly described, has perhaps allowed for a new concept of matter which may leave some room for better understanding consciousness. So far, consciousness can be said to be neither purely material nor purely non-material, and it has been suggested by Hameroff and Penrose, in their paper *Orchestrated Reduction of Quantum Coherence in Brain Microtubules: a*

1 This is the name given to the theory of fundamental particles and how they interact with one another.

2 Precisely where a particle is and how it is moving when observed is still 'indeterminate' and results in random measured values.

3 Those which do not incorporate quantum mechanics.

*Model of Consciousness*⁴, that it is instead a quantum phenomenon. Here it is proposed that the cytoskeleton⁵ of a neuron contains a number of microtubules⁶ that control the function of synapses, and that the state of consciousness is simply a manifestation of the quantum cytoskeletal state and its interplay between quantum and mechanical levels of activity. The theory begins with 'subjective' and 'objective' reduction. The former occurs when an observer measures a quantity in a quantum system. The system is not in any specific state, but in a 'superposition' of possible states until it is observed, and the observation causes the system to reduce or 'collapse' to a specific state. Superpositioned states each have their own space-time geometry, and under special circumstances to which microtubules are suited, the separation of space-time geometry of these superpositioned states⁷ reaches a point where the system must choose one state. 'Objective' reduction, therefore, is a type of collapse of the wave-function that occurs when the universe itself must select between significantly differing space-time geometries. This 'self-collapse' results in particular states that regulate neural processes, and these states can interact with neighbouring states to represent, propagate and process information. Each self-collapse corresponds to a discrete conscious event, and sequences of events then give rise to a 'stream' of consciousness. The proteins then somehow 'tune' this self-regulated objective reduction, which itself controls the operation of the brain through its effects on coherent flows inside microtubules of the cytoskeleton. Necessarily, there are two inferences to be made here. Firstly, it would appear from this proposed model that 'protoconscious' information is encoded in space-time geometry at the fundamental Planck-scale process, to which our minds are able to tune in, thereby suggesting a Platonic assortment of conscious states that exist in a world of their own. Secondly, it is the collapse of the wave-function that gives nature its non-algorithmic essence; in the absence of which we would simply be deemed automatons - this would make perfect sense for the knower forever remains unknown. The non-computational aspect of consciousness is entirely consistent with the very nature of quantum mechanics and the profoundly twisted geometry of relativistic space-time, in which the volatile behaviour of sub-atomic particles is to be regarded as the essential reality of an intractable world which give rise to all sorts of indeterminacies fundamental in nature.

Nowhere else is this better underlined than by the principle of the Einstein-Podolsky-Rosen ('EPR') paradox⁸. Bohr's⁹ response, in support of such principle, was that *quanta* only display such

4 Orchestrated Objective Reduction ('ORCH-OR') theory.

5 the structure that holds the cell together.

6 hollow protein cylinders.

7 known as the 'warping' of these space-times.

8 This thought experiment was designed to exhibit the failure of the 'indeterminacy principle' characteristic of quantum mechanics, in the case of the creation of a pair of twin particles and subsequent discovery of certain physical characteristics of those particles at some distance from the point of their

effects when in contact with physical obstacles or receptors, constantly making their presence known in a way that could only be observed and recorded in the mind of the observer. Einstein found this explanation objectionable on the basis that it conflicted with the common sense assumption that sub-atomic particles are localised pieces of matter with specific, deterministic physical qualities; even if they cannot be directly observed through consciousness. If Bohr's explanation was wrong, the indeterminacy principle was wrong and the whole fabric of quantum theory would be brought into question. Yet, quantum experiments, with the indeterminacy principle as an integral part, continued to predict experimental results with great accuracy. This was indeed a paradox – and one which, within our apparently material universe, only succeeds in highlighting the phenomenally subjective nature of consciousness as being indefinable in terms of consciously apprehended physical principles alone. The Copenhagen interpretation¹⁰ of quantum mechanics has since proved that no elementary phenomenon is a phenomenon until it is a registered phenomenon.

Corroboration of Bohr's view, (the 'Copenhagen interpretation') also leads us to the problem as to how one is able to determine whether *quanta*, the building blocks of physical reality, exist before registering in the consciousness of an observer. Intuitively, it seems they must, but this is the same logic that led to the EPR paradox. The 'Schrödinger's Cat'¹¹ anomaly highlights the difficulty of this question. If the cat, poison and radioactive source are all part of a quantum mechanical system, what must we say constitutes registration? Is the registration of the quantum triggering the release to wait for a conscious observer? Now, of course, it has been proven that the Copenhagen interpretation is correct and the problem of when and how the quantum wave collapse occurs is even more critical if we accept Von Neumann's conclusion in his classic work *The Mathematical*

creation. The principle behind this thought experiment was that if the particles were physical entities the indeterminacy principle failed.

9 Niels Bohr, physicist (1885-1962), was the first to apply the quantum concept, which restricts the energy of a system to certain discrete values, to the problem of atomic and molecular structure. An account of the debates between Einstein and Niels Bohr have been written by Bohr in an article titled '*Discussions with Einstein on Epistemological Problems in Atomic Physics*' (From *Albert Einstein: Philosopher-Scientist* (1949), publ. Cambridge University Press).

10 The 'Copenhagen interpretation' holds that quantum mechanics does not yield a description of an objective reality but only deals with probabilities of observance and measurement. Assuming wave-functions are not real, wave-function collapse is interpreted subjectively. The moment one observer measures the spin of one particle, he knows the spin of the other. However, another observer cannot benefit until the results of that measurement have been relayed to him, at less than or equal to the speed of light.

11 Schrödinger's cat is a famous illustration of the principle in quantum theory of superposition, proposed by Erwin Schrödinger in 1935. Schrödinger's cat serves to demonstrate the apparent conflict between what quantum theory tells us is true about the nature and behavior of matter on the microscopic level and what we observe to be true about the nature and behavior of matter on the macroscopic level -- everything visible to the unaided human eye. In this thought experiment, the cat's state (dead or alive) essentially depends upon the collapse of the wave-function to form a physical quantum from a decaying radioactive source in a box containing the cat, and a vial of poison that will be released when the quantum registers.

*Foundations of Quantum Mechanics*¹², that no physical separation is possible between quantum systems and classical physical objects. If *quanta* do not exist until they register as effects on a receptor and we have no way of knowing of them until evidence of their effects is received in our consciousness via a chain of *quanta* and receptors, knowing whether they exist or not without the presence of consciousness is problematic. The difficulty here, both for the investigation of consciousness and for physics is that posed by conscious distinction itself, that is, the objectively physical is always outside consciousness and is always its object, thus rendering all mechanisms we posit to explain consciousness *objects of consciousness*.

It must be borne in mind that the ORCH-OR theory is merely speculative, and it does have its limitations. By all means, we may easily identify the physical phenomenon of brain activity with an observed quantum process, since the macroscopic characteristics of physical objects and activity can be seen as generated from, and a necessary formation from microscopic account. However, it is not possible to establish how *sensory awareness* could be causally reduced to a comprehensive account of brain processes, despite the facility to observe how it explains all the physical effects of such an experience. The primary reasons for this are twofold. Firstly, the notions of cause and effect are applicable only to observed phenomena within the spatio-temporal sphere, and secondly, scientists are simply confined to accounting for phenomena solely in terms of other phenomena, always leaving behind an ineliminable residue.

The notion of the independence of the material world holds true, but it remains to be seen whether the concept of the material world being dependent upon consciousness can be evaluated by scientific hypothesis and tested, or whether it is plausible that the physical universe and consciousness are inter-reliant. To apply logic in an accurate manner, we may perhaps be forced to let our minds be open to possibilities other than those inferred by the assumptions of scientific physicalism and reductionism. Certainly, given the forms of our cognition of phenomena are presupposed in all scientific enquiry, it cannot surely fall within the province of science alone to investigate their nature. Scientific concepts and manners of representation may, in fact, themselves be interpreted in a way that does not require us to expect that anything is really being spoken of apart from perceived facts and empirical abnormalities. Berkeley, concerned at all times that terms and expressions should be related to particular 'ideas' of sense, characterised purported natural laws as no more than 'rules... observed in the production of natural effects', and Austrian physicist Mach denied that such laws could be spoken of as residing 'in nature'. Only individual instances or 'cases' of laws did this, the laws more appropriately being described as 'things of the thought'. Likewise, Mach questioned whether we should treat the 'unobservables' as real

12 Von Neumann, J., *The Mathematical Foundations of Quantum Mechanics* (1995), Princeton University Press.

existents, and when discussing atomic theory he described atoms as merely representing a mathematical 'model' so as to aid in the mental reproduction of the facts. It was impossible to accept the principle of their actual existence since they could not be perceived by the senses.

Substance-dualist views posit that the mental and the physical are both real, insofar as matter, of which the essential essence is that it is spatially extended, is a distinct entity to the mind, of which the essential property is that it thinks. Neither can be said to be assimilated into the other, and views of this nature are rooted in Descartes' *Meditations*. Descartes' model views the material world as pure extension, which is infinitely divisible. In this model, different portions of matter move along at various speeds from one to another, which is what differentiates things in the universe.

Many attempts to extend materialism through emergence theories usually follow the Aristotelian tradition, which is quite distinct to that of the Cartesian conception of the relation between matter and the incorporeal. For Aristotle, there was no exact science of matter and how substance behaved was essentially affected by the form that it is in. In this way, matter was perceived determinate made determinate by form. The Aristotelian model thus has many forms and substances, which necessarily result in many levels of ontology. Locke accepted a slightly revised view of the Aristotelian doctrine that material substances are the ontological correlates of logical subjects – that they are the things that possess qualities such as extension, figure and motion. He had argued in his *Essay Concerning Human Understanding* that the mind, observing through its ideas that an amalgam of qualities occur in regular sequences, naturally tends to explain these sequences in terms of the intrinsic 'properties' that objects have as part of their real essences. By considering the sources of human knowledge, Locke contended that we must take into account the ways in which such factors as the operations of our sense-organs contribute towards the character of our perceptual experience, and, in reducing mental and cognitive processes to mere sensations, he contended that although things may appear to us in a certain way, the characteristics that we attribute to them do not really belong to them unless they are primary in nature (such as size or shape).

Granted, we may take colour as a prime example - colour perception is not created by a chromatically discriminative optical system, for when chromatic data is accessible to the cognitive processes it can be referenced against an innate archetypal matrix of subjective imagery, allowing the perception of colour within the experiential visual process. However, the human mind is not a mere receptacle for sense-impressions and ideas. Instead it is ordered in determinate ways that we bring to the plain representations of sense in such a way as to make our normal experiences of a coherent, objectively known world possible. Time and space, for example, which cannot exist independently of each other, are essentially abstract/ mental constructs used to organise

perceptions.

According to Schopenhauer, the subjective correlate of what appears objectively as spatial and temporal determinations is 'sensibility', and the subjective correlate of causal determination is *understanding*. The necessary inference here is that space, time and causality exclusively belong to the 'object', and yet they are essential to the object *as such*, they may be discovered from the subject. To simplify, spatio-temporal features are forms of our sensibility, and by this I mean that we are made so that everything we are aware of in our sense-experience must appear to us in spatio-temporal terms. Reality comprises a multiplicity of phenomenal appearances, which is only rendered possible through space-time. As a result of the operations of the minds, as an agency rather than a mere recipient of discrete sense-impressions, we perceive objects as having spatio-temporal qualities.

Now, it is mistaken to think that mental phenomena supervenes on matter, for this would require the physical to generate mental phenomena without there being any explanation as to how it does so. Conversely, we should not merely accept that the physical supervenes over the immaterial due to the fact that properties assigned to physical objects belong to them independently of our perception of them (albeit ultimately explained by the contribution of human understanding).

Reductionist proposals appear to be negated by the very subjective nature of consciousness, since, despite all elaborate physicalist or functionalist explanations of it, it seems quite conceivable that a physically or functionally organised system could exist *without* any subjective experience. Similarly, due to the problematic subjective nature of consciousness and the irreducibility of consciousness toward third-person neurological processes, this has also all too readily been taken by dualists to mean that consciousness transcends the ordinary physical world, and lies over and above it. Let us consider the requirement that the application of notions such as *cause* and *substance* must be confined to experience. If we were to postulate the existence of *noumena* that lies beyond this sense-experience, and treat this as the ground of that of which we are empirically aware, this is the equivalent of extending these notions of cause and substance to talk about *ex hypothesi* what lies beyond experience and is unconditioned by our own position and nature as observers. If references to objects and causal connections is only legitimate in the context of empirical or phenomenal reality as serving to define the phenomena of the world of sense, then how can we make such references in order to connect the phenomenal sphere itself with what lies outside it? There therefore has to be a third, neutral conception which counterbalances these two contentions.

It is apparent that change arises only from *causality* a priori of all experience, and it is causality

itself that unites space and time. It is *causality* that is built into the notion of matter at the outset, and it is by virtue of space and time that reality can manifest itself to us as a world inhabited by a variety of individual objects. Our awareness of such empirical reality consists in the apprehension of ideas and representations which have as their basis the data provided by the senses, and are structured in accordance with the universal framework imposed by us as perceiving subjects. Matter may simply, therefore, be considered as causality, and although the existence of matter as solidity, impenetrability and extended forms cannot be denied, it has no such essence independent of the mental perception of causality. Mind and matter are thus ultimately to be conceived as attributes of what is essentially one and the same 'substance', a substance that is Platonic in nature and together with mind and matter makes up the totality of existence.

To expound, existence is best characterised by *three* realms as opposed to a mere dualistic entity; namely by the physical realm of determinism, the mental realm of actuality and the Platonic realm of potentiality. It is the mental which governs itself in the image of the former and the latter, since it is itself non-computational. The quantum aspects of brain functioning to produce the mind may be applied through physics, and from the Platonic we can infer the universal Platonic Idea which governs the classification of man's place in relation to nature. The mental provides the reference frame between both of these, which takes the form of "knowledge" of the physical and the Platonic in its own perceptions. By revisiting the Penrose-Hameroff model of consciousness, it is apparent that the electrical firing in synapses is discontinuous and discrete whereas consciousness itself is self-evidently sequential and continuous. Thus, the basis of consciousness must lie in an external, constant reference frame which is receiving these electro-chemical impressions within the space-time surrounding their occurrence. One that governs, yet perfectly coincides with, the system of operation for the aggregate organisation of massive bodies as a self-referencing, closed unit.

The "mind" is, then, an electrical *byproduct* of the physical brain, which can be inferred to be merely the sum electrical discharge in microtubules all having a common intersection of functioning and consistency of activity building up to an alteration in chemical structure. All of this forms the fundamental basis for the physical aspect of mental activity but, more importantly, *consciousness itself* is most apparently the only binding element for its phenomenon.

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