

## **Review of the Book “Quantum Enigma - Physics Encounters Consciousness”**

Huping Hu

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(Bruce Rosenblum & Fred Kuttner: Quantum Enigma - Physics Encounters Consciousness, 2006, 217 pp., ISBN 978-19-534250-5 [pbk.]

When the book review Editor of [this journal] asked me to write a review on this book [1], I gladly accepted not because I'm a quantum physicist but I've been in the trenches of scientific studies of consciousness over the past nine years as a biophysicist and outsider unencumbered by academic conformity and orthodoxy. So, perhaps I have something useful to add to the existing reviews on this excellent book. When I say “scientific”, I mean building concrete and testable models of consciousness connected to hard sciences (e.g., physics, neuroscience, biochemistry and physiology) and doing the experimental testing. I'm of the view that the state of consciousness studies is rapidly changing and the future promising.

In contrast to other books popularizing quantum mechanics, the importance and significance of this book lie with the facts that: (1) it explicitly discusses the connections between quantum mechanics and consciousness; and (2) it is used as course material for liberal arts students at Rosenblum and Kuttner's school (UC Santa Cruz) and perhaps elsewhere some of whom shall become consciousness researchers.

Teaching with humor and sometimes in parables, the authors skillfully expose the enigmas of quantum mechanics including their connections to consciousness. The chief enigmas exposed are: (1) The measurement problem which involves observer created reality and the randomness of Nature; and (2) Quantum entanglement, experimentally verified through violations of Bell's inequality, which suggests inseparability or nonlocality at the microscopic levels. Rosenblum and Kuttner also succinctly summarize

nine interpretations of quantum physics and point out in no uncertain terms that every interpretation encounters consciousness (pp. 158-169).

Sadly, as the authors tell us, instead of embracing such encounters and exploring the mystery of consciousness, the majority of physicists have been avoiding the consciousness issue like a plague over the last 80 years from the time quantum physics was born to the present (pp. 155-157). The authors explain that this sad situation is understandable to some degree because physicists like to work with hard sciences. In contrast, consciousness does not enter quantum physics through the deterministic and unitary Schrodinger equation but apparently operates from outside space-time through free will. Further, as the authors justifiably imply, the field of consciousness studies is infested with self-appointed authorities, pseudo-scientists and “snake oil” promoters who give the field a bad reputation and scare physicists away.

Indeed, in many fields of mainstream sciences today the study and even the mentioning of consciousness are still taboo and the physicists’ version of a theory of everything does not include consciousness. The irony is that, if we cannot understand ourselves and refuse to do so, how can we hope to understand fundamentally the world surrounding us. Isn’t the logic should be that in order to understand the external world fundamentally we need also (or we must first) understand how consciousness work? How can one call one’s theory a theory of everything if everything is not included?

It is my view that there are no legitimate excuses whatsoever for physicists and other scientists not exploring the mystery of consciousness and its connections to quantum physics. Rosenblum and Kuttner are highly commended for exposing physicists’ skeleton in their closet to the students and the public.

Although the authors clearly point out the connection between quantum physics and consciousness reflected in the measurement problem, they do not offer their own solutions to the problem. However, they do agree with Bell's view that quantum mechanics is so far correct on everything it predicts but incomplete and will be "superseded in an imaginative jump that will astonish us" (p88). Like the authors, I full-heartedly agree with Bell's view based on the findings of our own research.

Reading the book and reflecting on our own research, I get the impression that the reality is, indeed, an interactive quantum reality centered on consciousness as some may have suggested before and many experiments have shown so far. But the interaction between consciousness and reality seems to be a "chicken-egg" problem. The perplexing questions are: (1) Is quantum reality (the "chicken") produced and influence by consciousness (the "egg"); or (2) is consciousness produced and influenced by quantum reality? It is well known that this type of dilemma occurs when one searches for a first cause which is self-referential.

In their book, the authors have amply answered the first question in the affirmative. Indeed, Planck had concluded long ago that "I regard consciousness as fundamental. I regard matter as derivative from consciousness. We cannot get behind consciousness. Everything that we talk about, everything that we regard as existing, postulates consciousness [2]".

To make connection to the actual brain, the authors discuss Stapp's theory (pp.195-196). I applaud here Stapp's heroic efforts in the face of various criticisms [3]. However, the question of how consciousness influences the brain or through what quantum entities inside the brain is the brain being influenced is far from settled. To say

the least, Stapp's theory needs to be mapped to the correct quantum entities being influenced by consciousness in the brain. On this, Stapp so far takes the "high road". In our theory, the quantum entities are the nuclear and/or electron spins in neural membranes and proteins [4]. The only way to get the correct mapping is to put various models to experimental tests which so far are few and far in between.

On the other hand, since a conscious human observer is made of quantum entities, the second and reverse question should also be asked, answered and reconciled with the first question. On this, the authors discuss Penrose-Hameroff model with the observation that the model proposes a specific mechanism in the brain based on non-computability, quantum gravity and tubulins in microtubules (pp.194-195). Penrose and Hameroff are admirable for taking the "low road" with the risk of being ridiculed [5]. Penrose's arguments for the non-computability of conscious process are quite impressive and strong. But only experiments can tell whether his bold speculation of quantum gravity being the objective cause of wave function collapse ("OR") makes any sense. Even if the experiments would be successful, it is still a far cry from proving tubulins in microtubules are involved in consciousness as Hameroff suggests.

Many people feel that Hameroff's idea is misguided and Penrose got on the wrong "OR" boat, so to speak, not only because neural electrochemical activities occur in and around neural membranes but also the simple, tubular and uniform structures of microtubules make them unlikely to be the carriers of information related to consciousness. By the way, we have demonstrated experimentally that gravity is likely the manifestation of quantum entanglement [4]. Thus, in my opinion, the role of gravity

in consciousness is more likely to achieve binding and wave function collapse is associated with disentanglement.

The authors also discuss in their book the philosophy of Chalmers who classified the problems of consciousness into “easy problems” and “hard problems” (pp176-177). However, mere classification in itself will only redefine the problems but not provide any solutions. The real messages from Chalmers, as the authors point out (pp179-180), are that: (1) Reductive explanations of consciousness in terms of physical processes do not hold; and (2) Conscious experiences are as primary as mass, charge and spacetime and thus entail new psychophysical principles which treat information as having both a physical aspect and phenomenal aspect [6]. Chalmers is admirably a rare and clear-headed dualist who irks materialists and perhaps others by his ideas and, some would say, arrogance.

It is my view that Chalmers’ first point is only valid with respect to classical physical processes but not quantum processes which are fundamentally psychophysical. With respect to the second point, I can agree that consciousness is primary but I take that experiences are contents not entities. The authors point out that “[Chalmers’ dual-aspect information] smacks of the situation in quantum mechanics, where the wavefunction also has two aspect”, physical and informational (pp179-180). However, Chalmers seems to be skeptical about the connections of quantum mechanics and consciousness [6]. This is inexplicable and rather unfortunate. The authors also discuss the views of materialists such as Crick, Dennett and Koch which are diametrically opposite to Chalmers (pp 177-181).

The book also raises deep and old philosophical questions surrounding consciousness. For example, it quotes Einstein's statement that "I like to think that moon is there even I am not looking at it" (p125) and mentions the old question "If a tree falls in the forest with no one around to hear it fall, is there any sound?" (p175). To answer these fundamental questions, we need to reconcile the "chicken-egg" problems of consciousness and reality raised earlier.

I am inclined to believe that: (1) Consciousness is both transcendent and immanent (here I borrow the notions from certain philosophy of Hinduism), that is, the transcendental aspect of consciousness produces and influences reality as the interactive output of consciousness and, in turn, reality produces and influences immanent aspect of consciousness as the interactive input to consciousness; and (2) Human consciousness is a limited or individualized version of this dual-aspect consciousness such that we have limited free will and limited observation/experience which is mostly classical at macroscopic levels but quantum at microscopic levels.

As a limited transcendental consciousness, we have through free will the choice of what measurement to do in a quantum experiment but not the ability to control the result of measurement. That is, the result appears to us as random. On the other hand, at the macroscopic level, we also have the choice through free will of what to do but the outcome, depending on context, is sometimes certain and at other times uncertain. Further, as a limited immanent consciousness, we can only observe the measurement result in a quantum experiment which we conduct and experiences the macroscopic environment surrounding us as the classical world.

Applying this dual-aspect consciousness ontology, we would respond to Einstein with the answer that the moon would still be there even if he was not looking at it because it is produced/influenced by the (unlimited) transcendental consciousness and observed/experienced by the (unlimited) immanent consciousness. Similarly, the answer to the old question would be that there are still sound heard by the (unlimited) immanent consciousness. This latter answer is similar to the one given in the centuries-old limerick quoted in the book (p175). On a related matter, the authors point out that God is omnipotent but may not be omniscient (p176). To explain such seeming defect of God, it may be said his omniscience lives within each of us as our human experiences and observations.

The authors do not discuss in the book relativistic quantum mechanics, e.g., the Dirac Equation which combines quantum mechanics with relativity and describes fermions such as electrons and quarks. Perhaps, this is because the book is written for non-specialists. The Dirac equation contains the “mysterious” quantum spin which forms the key basis of our spin-mediated consciousness theory [4]. In my opinion, this is the equation containing one of the major keys to a genuine science of consciousness and may be called the “God Equation” as shall be shown elsewhere in due time.

In closing, let us remind ourselves the proverb that “the [truth] is in the details”. To eventually arrive at a genuine science of consciousness, we must build and experimentally test various concrete models of consciousness which are connected to hard sciences. By explicitly discussing the connections between quantum mechanics and consciousness and bravely using the book containing these discussions as course material for students, the authors show the readers and teach the students that such connections are

real and tangible not just pseudoscience or New Age mumbo-jumbo. In doing so, Rosenblum and Kuttner lead by example. Hopefully, other physicists and scientists in the academics would follow suit by breaking away from the invisible “prison” of conformity and orthodoxy, opening widely physicists’ closet containing their skeleton and turning the same into golden opportunities for solving the mystery of consciousness. I highly recommend this book.

### **References**

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