

**Remarks delivered by Revered Prof. Prem Saran Satsangi Sahab at the Panel Discussion on
'Consciousness, Decoherence and Measurement Problem in Quantum Theory'
at the International School on Quantum and Nano Computing Systems and Applications
(QANSAS 2012) organized at Quantum-Nano Systems Centre, DEI, Dayalbagh.**

December 2, 2012.

The panelists have already opened discussion and referred to the various researches in recent times which dwell upon the topics listed for debate. To me it seems that the developments in neuro-science on one hand and quantum theory on the other have brought about a need for considering an integration between psychology and biology. For instance, when neuroscientists wish to alleviate pain and suffering, depression and such aspects, and they come up with phenomenon like second pain, then it becomes necessary for them to consider the phenomenology behind second pain; that is, the one who is experiencing second pain is the best available expert to mention what the qualia concerning second pain is like. This is why an integration becomes necessary between experiential phenomenon and the scientific methodologies.

Similarly, when we consider human cognition, we find that it is not following necessarily rational thinking, and therefore, increasingly people explain human cognition by taking recourse to quantum probability mathematics rather than classical Bayesian probability mathematics. Pothos and Busemeyer have done considerable research to show that what appears irrational is not really irrational if considered from the point of view of quantum probabilities. As mentioned by Prof. Karmeshu, the recent issue of Scientific American, while considering the recent election in the United States, also raises this issue, and revisits the problem of prisoner's dilemma and interprets it from the viewpoint of quantum probability to show that seemingly irrational thinking is not really irrational and therefore there is a need to integrate the phenomenon of inner experiences with scientific methodology to explain the behaviour of human beings.

We are familiar with the quantum model of mind, e.g. two qubit model by Blutner and Hochnadel. This is the reason also why human cognition, human suffering can better be addressed by considering quantum biology, in particular, quantum brain biology. The experiments by Anirban Bandyopadhyay and his group including a recent paper by Sahu et. al. are also corroborating such possibility of quantum functioning of the brain rather than the classical model. There is again the phenomenon of the so-called associative thinking. When the brain is supposed to be at rest, having been apparently so instructed in a controlled experiment, it is having considerable activity in it as monitored by neuroscientists rather than being at rest. So, that has baffled the neuroscientists. This associative thinking, they also label as mind-wandering. The areas which get activated are primarily in the parietal lobe of the brain. If we take credence to inner experience of people, then these become explicable because these are precisely the areas which are mentioned in Vedic literature and other religious texts, particularly those of the Religion of Saints, that participate directly or indirectly in the meditationist experiences. This is how it all gets linked up with consciousness.

You have already alluded to the paper by Penrose and Hameroff which has raised this issue indirectly and kept alive the possibility that a quantum model of the brain could well explain how consciousness might be a factor in maintaining coherence or superposition and arriving at measurements which are affected by or influenced by the observer or experimenter himself. So there is nothing like observer-independent measurement. Although science would like to believe that measurements are objective completely, but the experimenter himself influences the observation. This is now increasingly being recognized and this has been supported by von Neumann-Stapp formulation in this respect of explaining the measurement problem in quantum phenomena.

It therefore seems meaningful as also seen from a number of publications in recent years, particularly in 2012. For instance, Price and Barrell, in their book on **Inner Experience and Neuroscience**, talk about the need for integrating experiential phenomena with the epistemology of scientific methodology of science in general. So, it appears that if we keep this option open of getting the reports from the first person experiences of those experiencing the phenomena and then use scientific methodology, the so-called third-person rationality in explaining those, invoking brain biology or psychology or whatever, then there would be greater success. One could formulate testable hypotheses, based on the first person experiences of those undergoing the phenomena, and then this would be more reliable and repeatable for carrying scientific conviction.

So, this trend seems to be a healthy one that increasingly bridges the gap between psychology and brain biology and further such attempts would help explain the various intangibles such as sentiments, emotions, thoughts, feelings, and should also be able to address the concerns of neuroscientists and neurophysiologists in mitigating the human misery. So that would be better addressed if you also look for this support not just from neuroscience, but also from psychology and philosophy, and what this means is that we should have an integration of inner experience with the various developed sciences such as neuroscience.

Thank you.