

Review of: "A New Approach Towards Quantum Foundations and Some Consequences"

Jean Patrick Connerade¹

¹ Imperial College London

Potential competing interests: No potential competing interests to declare. None

I hesitated to click on the box "I am knowledgeable about etc." because I am no expert in this particular aspect of the field, but I do believe I can make a few comments which I hope are constructive.

I found this to be a very interesting and (to me) novel approach. I fully agree that one must include in a quantum theory not only reality but also its perception by at least one observer (a minimum requirement), extendable to a wider group of different observers. Interestingly, this prerequisite to a physical theory can be traced back much further than QM. I found it in the aphorisms of Georg Christoph Lichtenberg, who was, of course, both a physicist and a philosopher.

The existence of accessible and non-accessible states is the novelty here. Paul Dirac would no doubt have been against this idea (which smacks somewhat of hidden variables) because his approach was to allow in the theory only what is directly "measurable." However, I do not think he really achieved that. Nor do I believe he gave a proper definition of what he termed "observability" other than by a semantic "pirouette" involving mathematical criteria, although I think (elsewhere than in his book) he suggested that what cannot be measured does not even exist.

So, it seems to me that the field is indeed wide open for an alternative approach, as pursued in the present paper. I suppose it may be qualified as the development of a "quantum logic," being a new branch of theoretical statistics imposed by, necessarily incomplete, knowledge of a physical system, along statistical lines Gibbs might have followed.

Where I still find a problem is in the treatment of time, which does not appear as a proper variable in QM since (in contrast to space) it possesses no associated operator or quantum states. It seems to persist in QM as an entirely classical variable. This poses a real difficulty when attempting to harmonize QM with relativity, since the latter requires space and time to be treated on an equal footing to construct a continuous and differentiable four-dimensional space-time metric.

I detect a similar difficulty here through the use of phrases like: "is the cat alive or dead at time t ," "at a fixed time," "at the same time," "if we let time vary," which appear diversely in the text of this paper and seem to imply that time, once again, has been separated from space in its properties...

I hope my remarks are helpful. I found this an excellent paper, which is why I am happy to comment about it.