

mpo - Please make a photocopy 24.4.57.
for me and send this original
to Hugh Everett.

Dear Hugh,

Thanks for sending the two papers. It was good to see that your ideas are now going to be published. During the past months I have often been wondering if we might see you here as we had hoped, and I trust that you have not quite given up coming and seeing us.

As you can imagine, the papers have given rise to much discussion at the Institute, especially with Bohr, Källén and Rosenfeld who was here for a few days. Kuman also read the manuscripts. Of course, I am not going to report in detail about these discussions, but I think that most of us here look differently upon the problems and don't feel those difficulties in quantum mechanics which your paper sets out to remove. Accordingly we cannot agree with you and Wheeler that the relative state formulation entails a further clarification of the foundations of quantum mechanics.

I don't think you can find anything in Bohr's paper which conforms with what you call the external observation interpretation. Rather, his analysis follows the line of the correspondence argument which was the basic guide in establishing the formalism as a mathematical generalization of classical theories. As emphasized in the Einstein-article there can on this view be no special observational problem in quantum

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mechanics - in accordance with the fact that the very idea of observation belongs to the frame of classical concepts. The aim of the analysis is only to make explicit what the formalism implies about the application of the elementary physical concepts. The requirement that these concepts are indispensable for an unambiguous account of the observations is met without further assumptions and is directly reflected by the way in which c - and q -numbers appear in the formalism. There is no arbitrary distinction between the use of classical concepts and the formalism since the large mass of the apparatus compared with that of the individual atomic objects permits that neglect of quantum effects which is demanded for the account of the experimental arrangement. There may be cases, e.g. in the treatment of the δ -ray microscope, where the placing of the separation is to some extent a matter of taste, but the free choice is limited to a region where quantum description is equivalent with the classical one. In the recording of observations, like a mark on a photographic plate, we are also concerned only with measurements performed on heavy bodies. Such recordings may of course be witnessed by any number of observers, and also as regards approximate measurements I can see no new problems.

I do not understand what you mean by quantized observers. Obviously, one can treat any interaction quantum-mechanically, including the interaction between an electron and a photographic plate, but when utilized as an "observer" the definition of the "state" (position) of the plate excludes

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considerations of quantum effects. It seems to me that as far as your treatment of many-body systems is consistent with the proper use of the formalism it has nothing to do with the measuring problem.

Of course, I am aware that from the point of view of your model-philosophy most of these remarks are beside the point. However, to my mind this philosophy is not suited for approaching the measuring problem. I would not like to make it a universal principle that ordinary language is indispensable for definition or communication of physical experience, but for the elucidation of the measuring problems hitherto met with in physics the correspondence approach has been quite successful. How radically this approach will have to be modified in order to cope with the many unsolved difficulties remains to be seen.

Betty and I hope to see you sometime when you have finished your work in the Pentagon. As you may know we have got a son who is now learning some elementary communication.

Please give our greetings to the Wheelers.

Yours,

Aage