

Quantum Physics and Classical Realism

Quantum physics is sometimes said to run counter to classical realism. Whether this is so depends of course on what the right version of quantum physics turns out to be. Then again, it may depend even more on what classical realism is.

People think of classical realism in terms of having things exist apart from being observed or imagined or contemplated. This idea is good as far as it goes. But in fact, standing apart from awareness is at most secondary and derivative. What is primary is that things exist within themselves as having their own natural being. Such natural being is existence in concrete fact, in contrast to existence as an object of awareness. Insofar as something has its own natural being, it has its own basis of existing, as opposed to being a construct from ideal or intentional being. Consequently, the thing may exist apart from being observed or imagined or contemplated. However, a thing is not diminished or dissolved away by being known. Thus, to take standing apart from awareness as primary is at best to mistake the symptom for the basis.

Given this analysis of what classical realism is about, one of the more serious challenges from quantum physics is easily answered. Various facts and features of the quantum world exist only when measured. Assuming this thesis to be correct, what then?

This thesis would at least count heavily against classical realism if it showed that the relevant facts and features depend on being perceived by some observing subject. But it does not show this, for the processes of measurement involved are wholly within the order of natural being. There is the application of the measuring instruments, and there is

the interaction of these instruments with the underlying background, and there is the result of the interaction. That is all. No perception by any observing subject is required.

The challenge arises because the ordinary concept of measurement is somewhat ambiguous. There is the work of examining an object in order to become aware of quantitative details about the object. This concern to explore and learn is not relevant here. Then there is the application of measuring instruments as the means by which this examination is conducted. Now, with macroscopic objects, the interaction between the object measured and the instrument will often be largely or wholly negligible. But only this interaction is relevant here.

This point may be illustrated by an example of a hypothetical situation. The example presented will be extreme in order to show the point very clearly. At least in theory, the apparatus for experimental observation could be duplicated by a series of explosions in the junkyard. When this had happened, there might then be the arrival of some photon at the screen, or the radioactive decay, or whatever the event may be. Under the impact of this event, the apparatus would then give forth the appropriate result. Even given that no observing subject is present, this result would presumably be the same as if the whole process had occurred in the laboratory.

This conclusion can be confirmed by examining carefully what is involved in the functioning of an observing subject. What happens is that the subject becomes aware of things by receiving impressions. But then the processes that impinge on the subject and produce the impressions must already exist, prior to such awareness, as a precondition for the observation to occur. Therefore, it will not work to say the results that come forth from instruments and apparatus exist only as observed.

Of course, observation may be active instead of merely passive. But what this activity involves is imposing various interactions on the object and producing results. Given these results, the subject receives appropriate impressions in consequence and develops further awareness on that basis. But here too, these interactions and results must be prior to the awareness for the observation to occur, and so all these processes are within the order of natural being. Insofar as measurement is itself an example of active observation, what all this entails is that the results of measuring are within the order of natural being and are not ideal constructs.

Moreover, it will not work to say (as Wheeler seems to have done) that the mind reaches back through time to make the results it perceives go this way or that way. For the whole idea of retroactive causation is based on distinguishing what happens later in time from what depends on something else or happens in virtue of something else. With retroactive causation, the claim is that what happens earlier depends on, or happens in virtue of, something that happens later. However, regardless of time, A cannot depend on B in the same way that B depends on A. (The short way to say this is that “the effect cannot cause the cause.”) Now, in the present case, the action of the mind depends on receiving impressions. But then it cannot also be that the events in the material world from which the impressions are derived are themselves produced by the action of the mind. On this basis, if the act of measuring were to influence what history is established as actually real, it would have to be that this act does so merely as an event within the order of natural being, apart from whether the event happens to be perceived. Once again, what happens would be just as if the operation were duplicated by a series of explosions in the junkyard.

Furthermore, it will not work to say that classical realism depends on the truth of classical physics, at least if by this be meant the framework descended from Galileo and Newton. Instead of depending on classical physics, classical realism depends on the reasons there are for thinking that there is awareness through experience because people are observing subjects who perceive things based on receiving impressions. These reasons, so far from being findings of physical science, are rather presupposed by all physical science, whether classical or modern.

Yet there is an important way in which classical realism may seem to depend on something very much like classical physics after all. For here is where the analysis of classical realism becomes critical.

Thus, one might think of classical realism as claiming first and foremost that things are independent of being observed. Depending on why independence is taken as primary, classical realism might have to say any tampering by the observing subject in the course of measuring can be wholly factored out, at least in principle. For this emphasis on independence may be based on the failure to distinguish the act of measuring as an event within the order of natural being from the cognitive content of the act (which content has ideal or intentional being). Given this failure, it will then seem that a thing is downgraded from being fully real to being at least in part an ideal construct, unless the influence of measuring can be wholly factored out. This claim may go with classical physics but not with quantum physics.

On the other side, one could understand classical realism in terms of the basic division between natural being and ideal or intentional being. Any independence real things have is then secondary and derivative. Given all this, things would still be real

even though the tampering cannot be fully factored out, provided all the processes involved are within the order of natural being.

Then again, these considerations may show that quantum physics does not support any claim that the quantum world is somehow constructed from experience. But there is still an obvious danger for classical realism. Given that various facts and features of the quantum world exist only when measured, it may seem that what is already there as existing in itself is blank or neutral. Classical realism must say that, prior to being measured, the underlying background has appropriate facts and features within itself as the basis for the results obtained by measuring. But it may seem that the underlying background turns out to be void of facts and features instead. If this were so, then classical realism would be false.

Now, if this were really so, then the underlying background would not include the basis to support any consistent regular order of functioning. Furthermore, it will not work to say what turns up is in fact only randomness instead of consistent laws. For what is at stake here is much more than just the falsity of determinism. The failure of regular order would be total. Thus, there would also be no consistent basis on which even to attribute probabilities. Nor would there be any consistent basis on which to speak of what would happen in hypothetical cases. Given all this, quantum physics would be false. Therefore, one must say quantum physics does not support the claim that, prior to being measured, the underlying background is void of facts and features.

Along the same line, there is the concern that it is meaningless to ask what is happening in the underlying background apart from those occasions when it is being observed. (Bohr is said to have entertained this concern.) But this idea is clearly false. For

there can be proposals regarding what is happening in the underlying background that are certainly not correct. Thus, to take an extreme example, the mechanical atomism of Democritus and Leucippus, or even of Lucretius, would have to be condemned as contrary to the available evidence. But of course, given that one can say what is not happening, it is clearly meaningful to ask what is happening. So then, this kind of positivism fails, and classical realism stands once again.

However, what might be true is that none of the observed facts and features exists until the measurement occurs. But this thesis is not contrary to classical realism. All that is required is that there be appropriate facts and features in the underlying background to which what is observed corresponds.

What this involves may be illustrated with a parallel case. An object's temperature at a given time, as presented to the senses, seems to be a simple quality. But in fact, there are no such qualities among the things themselves. Instead, there are complicated clusters of facts concerning batches of materials. Nevertheless, the perception of temperature through the senses is commonly veridical and not deceptive. For the concrete reality of things supports the correspondence of the qualities given in experience with what exists in fact. Thus, the truth about temperature is not contrary to classical realism, even though what is given in experience is a mere construct of sensory functioning. Similarly, the truth about the quantum world may not be contrary to classical realism, even given that what turns up in observation is largely a mere construct based on the activity of measuring.

Moreover, classical realism can accept having the actual reality of the underlying background be very weak prior to being measured. Even given classical realism, the

concrete reality of what is already there may include very little that is fully established as actually present. For almost all of this concrete reality may be facts of what would happen, or what would be developed, if various processes and interactions were to occur. All that is assured of being already actually present is whatever is required to support such “subjunctive” facts, and this may be minimal. Only some such minimal basis of actual reality, together with the appropriate structures of subjunctive facts that this basis supports, is needed for classical realism to hold good. For this is all that is needed to support the correspondence of what turns up in observation with what exists in fact.

Once again, a parallel case may illustrate what this involves. A given chemical may be poisonous or toxic to such and such types of living beings. Quite clearly, being toxic is then some sort of fact or feature belonging to the chemical. Yet, from the standpoint of the chemical as it is in itself, what impact there may be on various living beings is an external accident. So, in an obvious way, the toxicity of the chemical is much more a fact about those living beings. Therefore, even though it belongs to the genuine reality of the chemical to be poisonous or toxic, there may be no character of being poisonous actually present with the chemical, apart from its relation to living beings.

Similarly, there is (for example) presumably some sort of fact or feature belonging to the underlying background that supports the observed functioning of electronic momentum. Yet, it may perhaps be that electronic momentum is chiefly something that pertains to how this background can be measured with instruments, as opposed to being something intrinsic to the background as it is in itself. In that case, even though it belongs to the underlying background to support electronic momentum, there

would be no fact or feature of electronic momentum actually present there, apart from the availability of this background to be measured with instruments.

In these ways, then, classical realism can accept having the actual reality of the underlying background be very weak prior to being measured. Almost all of what is already there may be facts of what would happen, or what would be developed, if various processes and interactions were to occur.

But what if the limit case of this concern turned to be true? What if there were only the system of subjunctive facts as a “standalone” structure, with the actual reality already there being totally void? This idea is sometimes proposed more poetically by saying that, prior to being measured, the quantum world is just a shimmering sea of possibility or potentiality.

Now, even if this were so, classical realism would still stand. First, the system of subjunctive facts would itself exist as something within the order of natural being somehow. Second, experience through the senses would be based on the functioning of this system. Again, this functioning would also be within the order of natural being. These points go with classical realism much better than they go with any opposing idea that the quantum world is constructed from sensory experience.

In fact, however, this limit case is not so, for it is not possible. The reason is that subjunctive facts cannot work in this way. Insofar as what would happen or what would be developed is some sort of genuine fact, it must then be something real. What is unreal is merely fiction or illusion and not fact. But then, this reality of the subjunctive would also have to exist fully and properly, in order to be present as a standalone structure. Then again, the whole point of the distinction between the actual and the hypothetical is that

what is merely hypothetical is not fully established to exist in fact; what is fully established is actual instead. Therefore, any standalone structure of genuine facts must somehow be actually real. But then a standalone structure of subjunctive reality would involve having what pertains to the hypothetical as hypothetical be actually present, just in itself and apart from attaching to any basis of support. Since that would contradict the basic distinction between the actual and the hypothetical, it is not possible. On this basis, one may conclude that subjunctive facts cannot work in this way.

There is, then, the actual reality of the quantum world even prior to being measured. With this point, one of the more exotic proposals is dissolved away. In fact, the whole material world, including the instruments involved in measuring, is a vast quantum system. Thus, given that the quantum world is only a structure of subjunctive facts, there must be something beyond the material world to establish actual reality. The natural and obvious answer is that this something is the mind. So then, perhaps the actual reality of the material world depends on the conscious functioning of observing subjects to be developed or maintained, or even to get started. Von Neumann seems to have proposed some version of this idea.

However, since the quantum world is not only a structure of subjunctive facts, this whole proposal collapses. The results produced by measuring are instead based on the processes and interactions within the system of actual reality that is already present and then on the impact of the measurement itself as an event within the order of natural being. On this basis, classical realism stands even given quantum physics.

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