CONSCIOUSNESS OR PHOTON COLLAPSE: The Double Spit Experiment

From: NewForest Mex [mailto:nfmex@yahoo.com]
Sent: Monday, December 03, 2012 5:54 AM
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Subject: DR QUANTUM

Dear Dr. Wolf:

It has been a long time since I wrote, and I hope this email finds you well. I continue to follow your lectures via internet, and have gained a great deal from your new publications.

I have a brief question.
As the DOUBLE SLIT EXPERIMENT reveals such a deep mystery within Quantum Reality and its relationship to Consciousness, I was wondering how you respond to those who hold that the collapse of the wave function has nothing to do with consciousness, but is simply a "disturbance-effect" caused by the 'photon-bombardment' necessary for the observation/measurement to be made?

I have run across this response several times recently. It is well-put on this short YOUTUBE video addressed to you, in fact:

http://www.youtube.com/watch?v=FQ2U-iVc324

Would love to hear back from you on this.

My Very Best,

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p.s. I am aware of Dean Radin's impressive series of 6 new experiments on this very question in PHYSICS ESSAYS.
I would value your own brief "take" and "why?" Or kindly point me to where you might already have responded to this.

HIS RESPONSE:

I get this a lot. Such considerations as this one "the machine did it" are called "decoherence assumptions."

However, decoherence is not a theory—it is an assumption that when interactions between things becomes sufficiently complex, they are, for all intents and purposes, random and decoherent adding only noise to the ultimate observations. However, there is no such decoherence in quantum physics *per se*. Hence all decoherence does is to put mind under the rug so to speak and only consider activities that do not explicitly show mindful interaction with matter. To see how this works please read the following:

Consider the 2-slit quantum physics experiment. Here is the complete double slit explanation with some simple math concepts but no actual math calculations. If you understand this it will clear up questions involving decoherence and the observer effect in quantum physics and what physicists actually compute in their theories when doing quantum physics. For more in quantum physics read my books *Taking the Quantum Leap* and *Parallel Universes* and *Time-loops and Space-twists: How God created the universe.*

You need one outstanding quantum physics math fact. Possibilities in quantum physics are complex numbers. To determine the probability of an event with possibility A, you need to multiply this possibility A by its complex conjugate A*. Together you get $|A|^2$ which makes up the probability for the event. For more on this see any of my latest books.

Also look at the animation on the 2-slit experiment.
See http://www.whatthebleep.com/trailer/DS_sm2.wmv .

Most explanations of the 2-slit experiment fail to go into the interaction of a measuring device with the particle before it arrives at the screen.

Let me try to explain this according to quantum physics. Suppose we add a camera and a light source placed just in back of the slits.

Although it appears to not make sense, it is not the camera that makes the big change—it is the observer that does it. Let me use a shorthand to describe this. Let E be the electron, (so E_1 means electron at slit 1, and so on), S_1 slit 1, S_2 slit 2, and C the camera. Now when the camera is off or not interacting with the slits we have the following situation.

The quantum physics state of the whole system S is $(E_1 \times S_1 + E_2 \times S_2) \times C$. The two possibilities $E_1 \times S_1$ and $E_2 \times S_2$ interfere with each other--they add up their states. This is known as the superposition principle of quantum physics.

The camera C does not affect each possibility separately even though it multiplies their sum. This is just like in classical physics where you compute the probability of throwing a dice to get a six and flipping a coin to get heads. You simply multiply the probabilities $1/6 \times 1/2 = 1/12$.

When the observer comes into the picture he sees the whole quantum physics $(E_1 \times S_1 + E_2 \times S_2) \times C$ state and hence sees the interference pattern after many electrons hit the screen. Since C didn't interact with either slit that pattern is the same as if the camera were not there at all.

Now turn the camera on. If the camera captures a picture, its state will change according to either possibility C_1 or C_2 where C_1 means it went through slit-1 and C_2 means it went through slit-2. The whole system is now $(E_1 \times S_1 \times C_1 + E_2 \times S_2 \times C_2)$.

Now there are two possibilities (I) and (II):

(I) The observer doesn't look at the picture in the camera. This is most likely the outcome with an animal who doesn't know what to look for and doesn't see the outcome. The interference has been affected by the camera being in place and the camera's state has changed. If the observer were to observe this whole state $(E_1 \times S_1 \times C_1 + E_2 \times S_2 \times C_2)$, and not look to see what the camera recorded, he still wouldn't know which slit the electron went through and yet the whole pattern on the screen would change due to the presence of the active camera. He would only know that something changed in the experiment if he or the animal was capable of knowing anything at all about this..

According to quantum physics the probability for having the camera on and the observer not looking at its result is $(E_1 \times S_1 \times C_1 + E_2 \times S_2 \times C_2) \times (E_1 \times S_1 \times C_1 + E_2 \times S_2 \times C_2)^*$ [* means complex-conjugate]. This gives the probability to be $|(E_1 \times S_1 \times C_1)|^2 + |(E_2 \times S_2 \times C_2)|^2$ + rapid interference terms. The interference terms are nearly zero due to the complexity of having many particles in the film of the camera and the result seems just about random. This would appear on the screen as a jiggle of overlapping single slit possibilities with little interference. **Ignoring the interference effects is what is meant by decoherence.**

(II) The observer does look at the picture in the camera. Since he looks at the camera he will see either $E_1 \times S_1 \times C_1$ or $E_2 \times S_2 \times C_2$ and depending on which camera state he observes, he will "see" a slightly different result on the screen for where the electron went. If he would see C_1, it went through slit-1, if he would see C_2 it went through slit-2 and there is no interference any more. The observed pattern, either $E_1 \times S_1 \times C_1$ or $E_2 \times S_2 \times C_2$, would be slightly different than the whole state $(E_1 \times S_1 \times C_1 + E_2 \times S_2 \times C_2)$ although this would be very hard to detect.

Here is the reason it is hard to detect. In (II) while the camera is recording the result yielding $(E_1 \times S_1 \times C_1 + E_2 \times S_2 \times C_2)$ over and over again and he looks at the camera each time and then waits for a lot of looked at electrons to arrive on the screen, he would find an overlap of probabilities for each result. It's like asking for the total probability of finding a single die with either the number 2 or the number 3 showing. You add the separate probabilities of 1/6 + 1/6.= 1/3. So if you were to look at each camera after the camera took its picture each time you would get the probability to be $|(E_1 \times S_1 \times C_1)|^2 + |(E_2 \times S_2 \times C_2)|^2$ without the interference terms. This is very much like the result in (I) where the result is the same except for the rapid interference terms that are there from not looking at the camera. Since they are rapid they average out to a fuzzy result.

So ultimately the observer causes the change in the pattern although in this case the human observer plays a small role. This doesn't necessarily mean that putting the camera in place and turning it on doesn't change things--it does. This state $(E_1 \times S_1 \times C_1 + E_2 \times S_2 \times C_2)$ (camera on) is not the same as $(E_1 \times S_1 + E_2 \times S_2) \times C$ (camera off).

It makes little difference to do it this way or use two cameras or even just one camera. If the single camera is on behind slit 1, e.g., and nothing is recorded, the electron did not go through that slit and the observation that it did not also destroys the interference pattern because we then know it went through slit 2 since we don't see it go through slit 1. That is $(E_1 \times S_1 \times C_1 + E_2 \times S_2 \times C_2)$ becomes either $E_1 \times S_1$ or $E_2 \times S_2$ thus also destroying the pattern. For more you might enjoy reading about quantum physics in several books listed on my website such as *Taking the Quantum Leap*, *Parallel Universes, The Yoga of Time Travel,* and others. I would also suggest you read the Feynman lectures vol. 3.

In summary the observer destroys the interference between the possibilities. The camera doesn't. Note in particular even the observation that an electron did not go thorugh a slit produces the same result as observing that it did.