Temporal Entanglement

Source: Giza Death Star

by Joseph P. Farrell
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So many people saw *this* story and sent it to me that I have to talk about it. Indeed, if I had seen the story myself, I would have anyway, but in any case thanks to all of you who saw it and shared it, because if you've been following the wild and wacky world of quantum physics, and particularly the very strange phenomena of entanglement and non-locality, then it just became a whole lot weirder, for it seems that non-locality and entanglement are not restricted just to *space*, but also incorporate *time*, as I have speculated on this website before, and indeed, as many of the regular readers here – and in the members' vidchats – have as well.

Here's the story:

If You Thought Quantum Mechanics Was Weird, You Need to Check Out Entangled Time

The temporal non-locality experiment was conducted in 2013 by physicists at the University of Jerusalem, and here, as they say, is where "ye olde plotte thickeneth":

> *Up to today, most experiments have tested entanglement over spatial gaps.*
>
> *The assumption is that the 'nonlocal' part of quantum nonlocality refers to the entanglement of properties across space. But what if entanglement also occurs across time? Is there such a thing as temporal nonlocality?*
>
> *The answer, as it turns out, is yes.*

Just when you thought quantum mechanics couldn't get any weirder, a team of physicists at the Hebrew University of Jerusalem reported in 2013 that they had successfully entangled photons that never coexisted.

Previous experiments involving a technique called 'entanglement swapping' had already showed quantum correlations across time, by delaying the measurement of one of the coexisting entangled particles; but Eli Megidish and his collaborators were the first to show entanglement between photons whose lifespans did not overlap at all.

Here's how they did it.

First, they created an entangled pair of photons, '1-2' (step I in the diagram below). Soon after, they measured the polarisation of photon 1 (a property describing the direction of light's oscillation) – thus 'killing' it (step II).

Photon 2 was sent on a wild goose chase while a new entangled pair, '3-4', was created (step III). Photon 3 was then measured along with the itinerant photon 2 in such a way that the entanglement relation was 'swapped' from the old pairs ('1-2' and '3-4') onto the new '2-3' combo (step IV).

Some time later (step V), the polarisation of the lone survivor, photon 4, is measured, and the results are compared with those of the long-dead photon 1 (back at step II).

The upshot? The data revealed the existence of quantum correlations between 'temporally nonlocal' photons 1 and 4. That is, entanglement can occur across two quantum systems that never coexisted.

What on Earth can this mean? Prima facie, it seems as troubling as saying that the polarity of starlight in the far-distant past – say, greater than twice Earth's lifetime – nevertheless influenced the polarity of starlight falling through your amateur telescope this winter.

> *Even more bizarrely: maybe it implies that the measurements carried out by your eye upon starlight falling through your telescope this winter somehow dictated the polarity of photons more than 9 billion years old.*
>
> …
>
> *In both forward and backward directions, quantum correlations span the causal void between the death of one photon and the birth of the other.*
>
> …
>
> *Temporal nonlocality further complicates this picture: how does one describe an entity whose constituent parts are not even coexistent?*

(When I read that *last* sentence, I couldn't help but think of that strange saying in the Gospel of St. John, "Before Abraham was, I am," but I digress.)

Anyway, thus far, if you've been following that strange work (and world) of Dr. Nikolai Kozyrev in the Soviet Union's black projects community, or for that matter, the strange experiments of future-causation of past events that seems to be indicated by some paranormal psychic research, this won't sound all that unfamiliar. What it does perhaps portend is a quantum basis relationship to consciousness (such as Roger Penrose has posited), and perhaps a way to figure out the bizarre relationship between consciousness and the flow of time. Many of us, I suspect, have had some sort of "strange" experience with time, where it seems to flow faster, or slower, depending on a bizarre set of circumstances and our state of consciousness, such as we experience listening to certain kinds of music, or that momentary glance at a digital clock, when the interval between seconds seems somehow to have momentarily "frozen" and then "stretched".

But before I crawl way out on to (or rather, in today's case, completely *off*) the twig of high octane speculation, we can all breathe easier, because the "relativity ex machina" is ready to swoop in on its broom and save the day:

> *Just a spoonful of relativity helps the spookiness go down, though.*
>
> *In developing his theory of special relativity, Einstein deposed the concept of simultaneity from its Newtonian pedestal.*
>
> *As a consequence, simultaneity went from being an absolute property to being a relative one. There is no single timekeeper for the Universe; precisely when something is occurring depends on your precise location relative to what you are observing, known as your frame of reference.*
>
> *So the key to avoiding strange causal behaviour (steering the future or rewriting the past) in instances of temporal separation is to accept that calling events 'simultaneous' carries little metaphysical weight.*
>
> *It is only a frame-specific property, a choice among many alternative but equally viable ones – a matter of convention, or record-keeping.*

Whew! I feel so much better now; order restored, once again thanks to The Great Albert. Oh, but wait…

> *Einstein showed that no sequence of events can be metaphysically privileged – can be considered more real – than any other. Only by accepting this insight can one make headway on such quantum puzzles.*

Hmmm… ok… I don't remember reading *that*, but I'll go with it, because it certainly seems to be one of the many endless and always helpful discoveries that one can make in relativity

theory. But I still don’t feel very good about it, because it’s that little sentence that has me willing to step off the twig: “Temporal nonlocality further complicates this picture: how does one describe an entity whose constituent parts are not even coexistent?” The implication here is that any merely “ordinary” materialistic metaphysical description breaks down entirely. It’s unable to do so, it would seem to me, for the sentence is rather like the old biblical adage about being “in” the world but not “of” it. There’s a “something” – and perhaps, dare I say, a “someone” standing outside and underneath (a certain Greek word called hypostasis comes to mind here) that makes that entity of non-coexistent parts possible. Without it, there would seem to be no such thing as “histories” or memories to begin with, and therefore, no need for the observation that “no sequence of events can be metaphysically privileged.” (And that also sounds uncomfortably like the Mandela effect to me, but I digress once again…)

Or to put all this high octane off-the-end-speculation-twiggery as “country simple” as can be, perhaps we’re reaching the point where physics, in order to make any progress, is going to have to start turning serious attention to personhood, and to individual and group consciousness themselves, in order to find a way through the jungle.

See you on the flip side…