

Re: Twin paradox revisited II

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- *From:* "Martin Hogbin" <goatREMOVETHIS123@xxxxxxxxxx>
 - *Date:* Tue, 24 Jul 2007 09:55:43 +0100
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"bill" <cosmosco@xxxxxxxxxxxxxxxx> wrote in message
news:1185235954.440484.53780@xx

On Jul 22, 10:26 pm, "Martin Hogbin" <goatREMOVETHIS...@xxxxxxxxxx>
wrote:

"bill" <cosmo...@xxxxxxxxxxxxxxxx> wrote in
message news:1184981064.527191.20310@xx

On Jul 20, 7:11 pm, "Martin Hogbin"
<goatREMOVETHIS...@xxxxxxxxxx>
wrote:

No I would not. I cannot accept that the traveler **really**
believes
that the earth is orbiting the sun at around 1m-s nor do I
believe
that this is what would 'really' be happening.

This is the crux of the problem. The problem we have is that the
English language has evolved to describe things we see in
normal life. It turns out that, when high speeds are involved,
things are very different and we do not have words to adequately
describe what happens. Thus, in the current context, words
like 'really' and 'physically' do not have any useful meaning.

In everyday life, if I say something 'really' or 'physically'
happens, there is no need to explain what I mean; everybody
knows.

So, what can we do to come to any form of agreement?

Firstly, we can state the facts that are undisputed and
explicable without ambiguity in the English language. For
example, we agree that on his return, the traveller has

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aged less than the inertial twin. We can also agree that in the inertial frame of any twin nothing unusual happens.

Secondly, we can state what we expect the results of any measurement will be. For example, during the cruise phase, if either twin measures the clock of the other they will measure it to be running slower than their own. This statement applies to any and every sensible method of measurement. In other words, there are no sensible measurements whatsoever that do not show the results described above. Is this real? How real do you want? It is as real as the fact your head hurts when you hit it.

I agree that the travelling twin will see that the earth clock *appears* to be running slower than his own clock but if he insists that it *is* physically ticking...

You continue to try to understand what happens in terms of the normal meaning of English words. This cannot be done. There is no parallel to this situation in everyday life and no English words to fully describe what happens. If you cannot understand this point you will never make any progress.

over at a slower rate than his own clock he is denying Einstein's 1918 article by insisting that he, having experienced the force of acceleration, is *not* the moving twin.

I understand that the 'twin paradox' resulted from questions raised by people such as Dingle asking 'which is the *moving* clock?' and that Einstein attempted to overcome this paradox by pointing out that it is the clock that experiences a force of acceleration which is, in response to *that* question, *the* moving clock and that it is this *moving* clock that incurs time dilation.

Most people seem to be ignoring this factor, making no response to same.

It is the fact that one twin accelerates and one does not that makes the situation non-symmetrical.

Do you accept that in *Einstein's* opinion it is the accelerated clock that incurs time dilation *not* that the other clock incurs time *contraction*? I'm not referring to what some physicists now believe

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but what *Einstein* believed!

I cannot possibly answer the question as to what Einstein believed any particular moment and neither can anyone else. It is quite unimportant anyway. Einstein was a great physicist who proposed and developed his theories of relativity; he was not a prophet and to try to construe the meaning of every word is pointless.

Einstein showed that a clock that is made to travel in a circular path around another clock ticks over at a slower rate than the stationary clock. He did not, and would not, have written that the stationary clock is then physically ticking over at a faster rate than it was *before the other clock went into orbit* around it.

For a person accompanying that orbiting clock to insist that the stationary clock is *physically* ticking over at a faster rate than it was *before he went into orbit around it* is a ludicrous solipsist, philosophical concept that has no place in *reality*.

In SR, a clock made to travel on a circular path is not in an inertial frame. Making measurements from a non-inertial frame is complex and bizarre. Even in Newtonian mechanics, measurements from non-inertial frames are significantly more complicated.

He *can* say that the stationary clock *IS* ticking over at a faster rate than his clock but to insist that this has *physically* occurred – that the rate of operation of the stationary clock has *physically* increased rather than the fact that the rate of operation of *his* clock – as the result of its rate of travel with respect to the stationary clock – has decreased, is solipsist nonsense!

You really must try to understand the point I am making about use of the English language. You must define exactly what you mean by each of your emphasised words.

Anybody who suggests that during the first leg of the Hafele–Keating experiment the laboratory clocks physically started ticking over at a faster rate than the clocks in the aircraft and that during the second leg the laboratory clocks physically started ticking over a slower rate than the flying clocks is sprouting solipsist nonsense and if that's what 'physics' shows the somebody should have a good look at the subject of reality.

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That is not what I asked. Which of the orbiting clocks told the right time?

I very much doubt that Hafele or Keating, during the first leg of the experiment, insisted that they were not moving, that it was the planet's axial spin that had slowed down.

Of course not.

Thirdly, we can try to come up with forms of words which describe the situation. You might say that the mutual slowing of clocks is a consequence of measurement in the world in which we live.

On the other hand, *I* would say that the mutual slowing of clocks is a solipsist nonsense which introduced a paradox that Einstein, apparently unsuccessfully, attempted to solve.

This is not what all the world's physicist's would say.

This would be acceptable to most physicists. A more personal view is that physics is all about measurement, so the slowing is real, but here I am using 'real' in a specific way to mean 'as measured'. I would not use the word in this context without explaining what I meant by it.

If we 'measured' or 'determined' the shape of a steel rod placed in a tank of water we would *assume* that it has bent at the surface of the water however we *then* apply our knowledge (as Confucius suggested we should) and come to the conclusion that *in reality* the rod has *not* been deformed but that this is only a visual illusion in the same way that the *apparent* slowing down of a *stationary* clock is the result of a visual illusion created by *our* motion relative to *it*.

Correct. When we make a measurement of a relatively moving clock we do exactly the same. We make allowance for all known effects. _After we have done that_ we find the moving clock to be ticking more slowly than our own.

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We can also use analogies to explain what we mean or talk only in mathematical language. As Daryl has suggested the more ways you have of looking at the subject the better your understanding will be.

In 1989 I read an article in a local newspaper supposedly quoting David Mermin from Cornell University as stating that the moon physically ceases to exist if nobody looks at it. The author continued that it is the actual act of looking at the moon that creates its reality and that this is the belief held by some of the world's best physicists.

Such points may be relevant to a discussion about quantum mechanics but they are not relevant to SR.

I asked a physicist if they truly believed that this would take place and his response was 'No – but that's the closest analogy to what the mathematics shows.' When I asked him the value of a mathematical proposition that has *no* application to *reality* he suddenly remembered an urgent job back at the office and promised to get back to me.

Maybe another day.

Having noted, in his contribution to 'James Clerk Maxwell: A Commemorative Volume', that sense perception creates reality, Einstein also insisted that he liked to believe that the moon is still there even when he's not looking at it.

Fine.

Having initially set out to establish the validity of mathematics, Bertrand Russell was reluctantly forced to conclude "Mathematics may very well be a subject in which we never know what we are talking about nor that what we are saying is true."

No doubt.

In his address to the Prussian Academy of Sciences in 1921 Albert Einstein stated "As far as the propositions of mathematics refer to

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reality, they are not certain; and as far as they are certain, they do not refer to reality."

Yes, he did.

A former Head of the School of Mathematics at the University of New South Wales, Australia, Professor Simon Prokhovnik in his article 'The twin Paradoxes of Special Relativity: Their Resolutions and Implications' (having provided an equation in support of his theory) wrote "There are plenty of self-consistent mathematical systems which have scant relevance to physical phenomena or observations."

I agree, but SR is not one of them.

Having read Maxwell's mathematical interpretation of his work Faraday wrote to him asking if he could provide an everyday version of that work so that he (Faraday) could understand it. Apparently there was no response

However, Maxwell's interpretation of Faraday's turned out to be one of the most successful theories of physics ever.

It must be very difficult to provide logical analogies for mathematical systems that have no application to reality.

So he **really** believes that the earth is **physically** orbiting the sun at 1m-s?

Yes. It least I would in his position.

You need to define 'physically'.

That the traveler destroys all life on the planet.

By that definition, there is no change on Earth 'physically'.

In his opinion, all life is extinguished yet you classify this as

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being 'no change'?

Incorrect. as explained below, he does not believe that.

If I was in his position I would head for the nearest star.

Having 'believed' that all life on the planet has been obliterated it would not only be 'from the earthbound twin's point of view, nothing unusual has happened' but also from the *traveler's* point of view.

No he does not believe that. Although he measures time to have slowed down on Earth, all the laws of physics are also transformed in such a way that life goes on as usual. It is never the case in SR that one observer measures a different final outcome from another. Are you familiar with the 'pole and barn' paradox.

Yes.

The bit you have not grasped is that the passage of time is not universal. This is very counterintuitive but it is the inescapable conclusion of experiment.

Or rather, in the *interpretations* of those experiments.

I agree that all experimental results require interpretation but the interpretations used in SR are no different from those used in Newtonian physics. If you use light to measure some distant event you must make allowance for its transit time, for example. This is perfectly normal, indeed not to do so would be an obvious error.

In their book 'The Matter Myth' Professors Paul Davies and John Gribbin depict the explosion of a star that is two light years away from the earth at the instant that the light from another exploded star located another two light years further out reaches that star's

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location and point out that, from our point of view, those stars exploded simultaneously *and* at the very instant that we saw those explosions based on the concept of 'zero four-dimensional spacetime continuum' whereby we do *not* 'make allowance for [lights] transit time'.

In his book 'Fiction Stranger Than Truth' Nikolai Rudakov quoted Mendelssohn as stating

"It is not much sense for an astronomer, who sees a flare appear on the sun, to say that the flare occurred eight minutes earlier because the light takes eight minutes to travel this distance. Since no faster means exist to inform the observer sooner of this event, the latter only acquires physical reality for him at the moment when he sees it."

This refusal to accept reality, i.e. not allowing for the transit time of light, *is* 'an obvious error' or, in my opinion, mushroom treatment.

Yes, of course it is. If you believe that relativity does that you are suffering under a serious delusion.

In 'The Matter Myth' Davies and Gribbin suggest that as the result of its inherent uncertainty people may have turned away from the subjects of physics and mathematics and turned toward religion however in that same book they actually contribute *toward* that uncertainty writing that a galaxy that is moving away from us at superluminal velocity does not contradict special theory on the basis that it is *moving away from* not *moving past* us.

As from the very instant that an object has moved past us it is then moving away from us and it is this type of misinformation that I am trying to overcome.

As far as I
am aware there has been no experiment which proved that
from the
traveler's point of view it is his twin that ages at the faster
rate
than himself.

Over the whole journey the HK experiment does just that. When the two clocks meet, one shows more elapsed time than the other. We obviously cannot ask the clocks what they believe but we have to take it that each clock measures time. In other words, if you fancifully

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asked each clock what had happened during its journey it would say 'I measured time to pass as normal, I therefore presume that the other clock has run fast/slow while we have been separated'. Or to put it another way, you tell me which clock in the HKX told the right time.

They *all* told the right time *in their reference frame* but, as above, it would be ludicrous for Hafele or Keating OR their clocks to insist that the laboratory clocks physically ticked over at different rates depending on the aircraft's relative motion compared to their rates of operation *before* the experiment commenced.

I did not suggest otherwise.

—

Martin Hogbin