

Re: Twin paradox revisited II

Source: <http://sci.tech-archive.net/Archive/sci.physics.relativity/2007-07/msg02508.html>

- *From:* "N:dlzc D:aol T:com \(\dlzc\)" <dlzc@xxxxxxx>
 - *Date:* Sun, 22 Jul 2007 18:03:28 -0700
-

Dear bill:

"bill" <cosmosco@xxxxxxxxxxxxxxxx> wrote in message
<news:1185150277.116510.125670@xx>

On Jul 21, 11:53 am, "N:dlzc D:aol T:com \(\dlzc\)"
<d...@xxxxxxx>
wrote:

Dear bill:

"bill" <cosmo...@xxxxxxxxxxxxxxxx> wrote in message

<news:1184981064.527191.20310@xx>

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

...

That is really two questions. On the basis of the best measurements he can make, and allowing for all effects that he can think of, the traveller calculates that the other twin's clock is running more slowly than his own during the cruise phase. I such circumstances I would believe that this is what is 'really' happening. Would you come to the same conclusion?

Re: Twin paradox revisited II

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.

It is not about "believe" but about "measure".

On the basis that 'observation creates reality' – that what one 'measures' (or 'observes' or 'determines') *is* reality why would a person – who *believes* that observation creates reality – having determined something then insist that he does not believe what he is seeing?

It is a common practice here. You must be new. ;>)

You can go
outbound fast enough that you could see the
Earth take millions of years to orbit the Sun
once. But it will move like a bat out of h*ll on
your return journey.

And aren't those observations (determinations)
nothing more than visual illusions generated by
the red shift and blue shift of the light from the
planet?

Problem is, if you total up the number of such full orbits, it
will agree with the stay-at-home's age, and not the traveller's
age.

The original posting was that because the
astronaut sees the light from earth as being
intensely blue shifted he then believes
(determines) that his twin is physically aging at
a faster rate than he is.

For that matter, he should insist that his stay-at-home twin is
being bathed in X-ray and gamma radiation from his Sun... it's
surface temperature is now too high to allow life on a planet as
close as Earth.

Re: Twin paradox revisited II

My question is – on the basis that the astronaut sees 'the earth take millions of years to orbit the sun once' does he truly believe that whilst he is moving away from us that the earth's orbital velocity *physically* reduces to a mere 1K–s and, as he returns and sees it moving 'like a bat out of h*ll' does he really believe (determine) that the earth's rate of travel has increased to an impossible near light speed?

He can measure and assume he is a "virgin", and infer that all those changes are "physically happening". He can make those measurements, and assume he is a devotee of classical Doppler, and infer what he sees as much better, but still not agree with the stay-at-home twin. Or he can make those measurements, and use relativity, and determine exactly what the stay-at-home is measuring for him/herself.

It is not a question of what he is measuring. The question is what can he do to make sense of it?

During the acceleration the situation is much more complicated but the answer is essentially the same.

As regards whether it is 'physically' happening, I cannot answer this question unless you define exactly what you mean 'physically'.

By 'physically' I mean the concept that the earth is 'really' orbiting the sun at 1m–s as distinct from 'apparently' as determined by the traveller.

One expects that the Earth really could care less how fast the traveller is moving.

My point exactly.

Re: Twin paradox revisited II

But relativity is about what you measure, and what you can correctly infer about what another frame might measure (based on your own measurements).

So if you measure that the earth is orbiting the sun at $1K-s$ are you of the opinion that it is *physically* orbiting at that velocity?

If it was, it would be pulled into the sun.

Not at all. If you were entirely clueless, and assumed you knew nothing about the physics of the Sun–Earth system, you would still be able to make that system work. The mass of the Sun and Earth would have the same proportion as the stay–at–home twin would say it was, but the total mass would decrease to make that orbit "work out".

It isn't "physically" anything. If you insist on ignoring everything you know, you can make the physics work.

It has nothing whatsoever to do with what *we*, as stay at home observers observe, think but what is claimed the *traveler* determines is reality.

Yes, for the traveller.

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

If that is what he measures *in his own frame*. If he forgets to use relativity to calculate how fast the Earthlings would calculate it was moving.

So he sees (determines, measures) the planet moving at *physically impossible* orbital velocities

.... physically *possible* ...

Re: Twin paradox revisited II

but then applies relativity and concludes that the earth is *not* moving at those velocities *in its own reference frame*

.... in fact is moving no differently than it was when he lived there.

ergo he must realise that what he *sees* is nothing more than a visual illusion created by his relative rate of travel.

Given that the traveller comes back younger than the stay-at-home, yes that is correct.

The original posting was to the effect that from the traveler's point of view, the earth *is physically* moving at those impossible velocities.

Which is both true and false, and ultimately leads to your confusion.

My argument was that the traveler would *presumably* have some sort of education *in* physics including relativity thus that he should, as Confucius suggested, *apply* (not forget) that knowledge.

Some of the postings in this discussion imply that the traveler is *incapable* of applying knowledge and makes his decisions on the basis of a purely solipsist, philosophical attitude.

The Galilean 'Principle of Relativity insists that the traveller cannot know if his ship is moving with uniform velocity or is at rest *without reference to an external point* i.e. he cannot *see* the universe 'rushing past him' at near light speed.

Or the Sun-Earth system.

The original posting

Re: Twin paradox revisited II

.... in this context, I think you mean "the original poster", or OP for short ...

insisted that the faster aging rate of the earth twin **only** takes place during acceleration following turn around and that it does **not** apply when the ship stops accelerating. In other words, at the very instant that the traveler takes his foot off the gas the earth's rate of travel around the sun reverts from near light speed to 30K-s **instantaneously**.

That is incorrect. The values of acceleration are unimportant **in SR**. And are really outside the scope of SR, except in some very limited cases. It is "velocity history", essentially "how fast" for "how long" that matters.

The traveler must **know** that this cannot possibly occur in reality thus must conclude that what he **saw** (or measured or determined) was **not** reality either in his reference frame or the earth's reference frame.

It **was** reality for him, because that is what he measured.

Other than what one 'could argue' I fully agree with those comments but I cannot agree, as expressed above, that the stay at home **physically** ages at the faster rate thus that the traveler could obliterate all life on earth by taking his foot off the gas pedal.

You need to define 'physically'.

That the traveler destroys all life on the planet. When he returns home he learns – hopefully – that this has not **physically** taken place.

Re: Twin paradox revisited II

It physically *has* taken place. And the traveller had squat to do with the stay-at-home aging, only to do with his own "lack" of aging... with his "gas pedal".

Are you suggesting that the traveler returns, given the respective factors, that he actually finds that all life on the planet *has* been obliterated?

I still don't see how you achieve "obliteration". If you mean "his twin has aged more than him, including the possibility of death and meeting his own grand-kin", yes.

If the traveler is of the opinion that he has not aged at the slower rate

Nothing in his frame will seem slower to him. Only on comparison of his clock to the Universe will come surprises.

but that his twin ages at the faster rate he is denying Einstein's 1981

He died in 1955, what did you mean?

insistence that it is the clock (the twin) who experiences the force of acceleration which is the one that *physically* ticks over (ages more slowly).

The twin paradox can be performed with 3 clocks (3 people if you like), and no acceleration within the period of the experiment (departure to final arrival). The acceleration is just part of the gedanken, and not a requirement (unless you insist on seeing the same twin arrive and meet his older twin).

The fact that the traveler finds on his return that everything is 'normal' back here – that life continues – should indicate to him that the earth had *not* been orbiting the sun at near light

Re: Twin paradox revisited II

speed, that what he saw or
determined was
nothing more than a visual
illusion generated
by his rate of travel.

No, it indicates that the passage of time is
not
universal. Of course, on his return, the
traveller
will be aware that, from the earthbound
twin's
point of view, nothing unusual has
happened.

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.

Except that the traveller is younger than eh
stay-at-home.

Irrelevant to the specific topic , merely a reiteration.

I guess that depends on what you mean by "obliterate" then.

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.
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.

Re: Twin paradox revisited II

Yes, exactly that has been experimentally determined. Slow particles with short lifespans age more rapidly than faster ones. And it has nothing to do with "acceleration" or "accelerators" or "magnetic fields" or "new and unexplained physics".

Those experiments have shown that accelerated particles

.... no, "fast moving" ...

age more slowly than slower moving particles but they do *not* prove that the latter, and the universe, ages more rapidly.

Compared to the fast moving particle, who can insist *nothing* changed for him, the Universe ages more rapidly.

The concept that the stationary particle ages at a faster rate than the accelerated particle should be sufficient for physicists to stop all of those experiments which cause them to age at a faster rate than would otherwise occur.

This is a joke, right?

The length of a journey between any two points depends on the path you take. This applies equally well if the "points" are elapsed time on a clock, and relative motion provides the different path between start and end of journey.

That has nothing to do with the original posting which insisted that the stay at home twin physically ages at the faster rate and *only* during the traveler's period of acceleration following turn around.

Which is in part incorrect.

David A. Smith

Re: Twin paradox revisited II