

Title: Spacetime

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## **Spacetime**

Spacetime is a mathematical model – a construct – wherein time (t) is combined with space (x, y, z). It comes up short of being a physical reality.

We have freedom of movement in space, but we do not have freedom of movement in time. "t" has a completely different status from that of "x, y, z". Small wonder that spacetime adherents fail to resolve – by way of employing a spacetime diagram – a paradox of their own making. It is time-keeping (i.e., clocks, whether of a chemical, biological, mechanical or electromagnetic nature), not time in the sense of the march of history, that changes.

Kinematical time-keeping is strictly dependent on the actual speed of light and one's motion as a percentage of that speed. It is that simple, as we diagram in the article linked to at the bottom of this document.

Spacetime is a useful calculation tool, yet it is a construct, entirely dependent for its existence on Einstein's utilitarian approach to clock synchronization – a clock synchronization which is not even required for deducing the effects of special relativity, and which vacates the absolute frame of reference – the universe itself.

Spacetime generates a false jump in the reading of time passage:

The best one can do with a spacetime argument in the context of the twins paradox (which involves a change in inertial motion) is to note that a traveler, upon his turn-around, will observe a jump in the reading of the clock time of the stay-at-home using the "lattice of clocks" method dictated by the dismissal of the underlying reality of space (or the universe) itself:

It is precisely one's motion with respect to the universe – and to the same end, one's speed as a percentage of the actual speed of light – that dictates that party's actual kinematical clock rate, resulting in the actual kinematical time-keeping differential which is seen upon reuniting with the other party.

Any attempt to explain an actual time-keeping differential while forbidding "the actual" is doomed to fail in a purely logical sense; in a purely mathematical sense.

Einstein's clock synchronization ( $t_B - t_A = t'_A - t_B$ ) correctly dictates an equal time-keeping value for the interval of a translation of a pulse of light, whereby spatially separated clocks of the same inertial frame record equal time passage for a pulse of light moving in either direction through the particular frame. But by specifying that equation without context (he doesn't consider the actual constancy of the speed of light), Einstein disregards the physical nature of those clocks. [1]

Thus, in Einstein's treatment, that equation ignores "the actual" – the physical reference frame of the universe. In so doing, the time-keeping of every clock, regardless of its actual inertial frame, is unfortunately elevated to a reality of time passage, with no clock's reality given favored status.

That works well until there is a change to a new inertial frame, at which point Einstein has no explanation for the "peculiar" disparity in time-keeping between reunited clocks. His clock synchronization, without consideration of the underlying reality which dictates it, leads directly to the "lattice of clocks" methodology which is in lock step with spacetime diagrams. It has the "jump in time" built in for any situation involving a change to a new inertial frame.

It is in a spacetime diagram that we find the infamous sudden shift of a line of "simultaneity" (simultaneity *as perceived*). The further away (or the higher the overall speed) the inbound and outbound astronauts are from the stay-at-home when the "sudden turn-around" occurs, the greater the magnitude of the "jump in time" as dictated by the "lattice of clocks" specific to the newly adopted inertial frame. It is the so-called "misperception" explanation of spacetime diagrams.

It is nonsense.

Minkowski's flat spacetime, being dependent on a purely relativistic approach, perpetuates an unresolvable twins paradox of one's own making:

There are always two ways in which to construct a spacetime diagram – one which favors one party and one which favors the other regarding who ages the least.

In *Spacetime & Electromagnetism*, Lucas and Hodgson, using the spacetime paradigm,

**wrestle with the twins paradox for fifteen pages,**

**and claim no resolution.**

In a footnote on page 73, they write: "Is it fair to give the Earth-bound twin the vertical world line? Does not that beg the question in his favor? Why not draw another diagram with his world line set at an angle to the vertical, and his lines of simultaneity correspondingly inclined (but at a contrary angle) to the horizontal?" [10]

That alternative diagramming of the situation is identical to the consideration that one might just as well consider that it is the earth, along with the entire cosmos, that changes inertial frames. That, in fact, is something we hear often from commentators on relativity, as they attempt to make their case for "no truth of the matter".

Of course, such claim simply makes the twins paradox unresolvable, as either party can then lay equal claim to being the party that ages the least. That is demonstration that one must consider the entirety of the cosmos, the imparter of inertial properties, to be the judge of the matter regarding actual motion.

Again, kinematical time-keeping is strictly dependent on the actual speed of light and one's motion as a percentage of that speed.

See: [Symmetry of Measure in Relativity](#) (journal article)

See: [Relentless ambiguity](#) regarding the speed of light

1. Einstein did, ultimately, forcefully argue for the pertinence of the structure of space in special relativity in order for there to be standards for distance, clocks and rods. It was the subject of his [lecture](#) at Leyden, fifteen years after producing his special theory of relativity. His initial treatment, in 1905, was absent of any consideration of space as the backdrop for motion; and that initial treatment is the one still wrongly embraced by the physics community at large.

See [sitemap](#) for my other articles:

Symmetry of measure – Journal article preprint

Fallacy of strict relativism – in relativity

Replacing Einstein's postulates

Einstein at Leyden – Standards for clocks and rods

Spacetime curvature - Why it works in GR

Computing GR and SR time-keeping dilation – with discussion

Spacetime – is a mathematical construct

Twins paradox animation – and simple equation

Citation and annotation for the book *Relativity Trail*