the general science journal

Special Relativity Clock Absurdity

Jeremy Fiennes (jeremyfiennes@gmail.com)
(rev: 17/08/2020)

Abstract

The Special Relativity clock absurdity is a simpler version of its 'twin paradox'. Briefly outlined here, it provides the most direct refutation of SR.

Introduction

The Special Relativity *Clock Absurdity* is a simpler version of its so-called 'twin paradox'. 'So-called', because a 'paradox' is defined in the dictionary as "a *seemingly* self-contradictory or absurd statement"[a]. The classic example is the 'Achilles and the tortoise' paradox, posed by Zeno of Elea. The clock case is not, however, a *seeming* contradiction. It is a *real* one. Not conforming to the definition of a paradox, we call it the 'clock absurdity'.

In his seminal 1905 *On the Electrodynamics of Moving Bodies*[1] Einstein wrote :

> "The unsuccessful attempts to discover any motion of the Earth relative to the 'light medium' suggest that the phenomena of electrodynamics, as well as those of mechanics, possess no properties corresponding to an absolute rest. But rather that the same laws of electrodynamics are valid for all frames of reference for which the equations of mechanics hold good[b2]. We will raise this conjecture to the status of a 'relativity postulate'. And will introduce another, only apparently irreconcilable with the former. Namely that light is always propagated in empty space with a definite velocity *c*, independent of the state of motion of the emitting body."[3]

---

[a] Italics ours.

[b] All inertial frames.

In his 1916 Relativity article he added:

> "According to the theory of relativity there is no such thing as a 'unique' (lit. 'specially favoured' or 'marked out') co-ordinate system."[4]

The "unsuccessful attempts" he refers to are presumably the alleged 'null' result of the 1887 Michelson-Morley aether-wind experiment[a5].

These two assumptions form the so-called *Einstein postulates*. Apart from the implicit (and invalid) reference to Michelson-Morley, he provided no substantiation for them. They were things he wanted to be true. So he simply postulated that they were.

The first 'relativity' postulate is resumed by saying that *all the laws of physics* – and not just those of mechanics – are the same for all inertial observers:

– 1) the laws of physics are the same for all inertial observers

In contemporary relativistic jargon: no inertial observer is "privileged" or "preferred"[b] – effectively that all inertial observers' viewpoints are correct:

all inertial viewpoints are correct

The second 'speed-of-light' postulate says that the speed of light *c* in a vacuum is constant:

– 2) the speed of light c in vacuo is invariant

Clock slowing (1)

The second postulate – of a constant speed of light for all inertial observers – might at first sight seem contradictory. A physical wave is not itself a material object. It is a time-dependent *event*, a *disturbance* propagating through a *medium* at a characteristic speed *c* given by the properties of that medium:

wave = disturbance propagating through a medium at a characteristic speed c given by its properties

To say that the speed of light *c* is constant for all inertial observers[c], is like saying that the speed of sea waves relative to a boat is always the same, regardless of whether it is sailing upwind or downwind. And is therefore apparently nonsensical.

"Aha!" said Einstein, the difference is that at 'relativistic' speeds comparable to that of light, firstly *clocks run slow* – so-called *time dilation.* And secondly, *lengths contract* proportionally in the direction of motion[d]. The speed of light that an

---

[a] In fact positive, discussed in detail in the companion 'Aether' article.

[b] Einstein's "unique" or "specially favoured" (p.2).

[c] Rather than through its medium.

[d] The Fitzgerald-Lorentz length contraction.

observer measures, the ratio of the two[a], is then always the same. He described his *eureka* moment:

> "I had discussed every aspect of the problem with a friend of mine, the Italian Michele Besso[b]. Returning home I suddenly I saw where the key lay. *Time* cannot be absolutely defined. Next day I said to him: 'Thank you, I've completely solved the problem'. With this new concept I resolved all the difficulties; and within five weeks the Special Theory of Relativity was completed."[6]

Einstein's reasoning was the following. Consider an observer A standing at a railroad station with a *photon clock*, a single photon of light reflected vertically between two mirrors that emit a "tick" every time the photon hits them, Fig. 1a. If for instance the mirrors were 1 m apart, and the speed of light was 1 m/s, the photon clock would tick once a second.

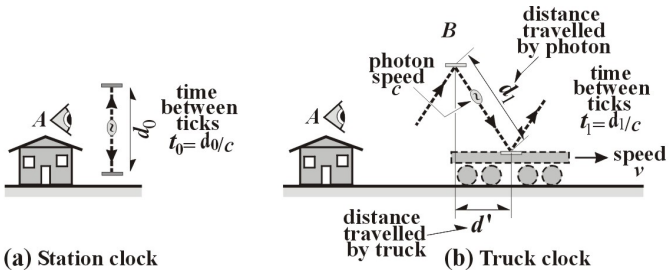

Fig. 1. Clock-slowing (1).

A photon clock is shown in more detail in Fig. 0-2.

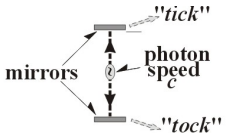

Fig. 0-2. Photon clock.

Now consider a second individual B with a similar clock on a *railroad truck* moving at a steady speed *v* relative to observer A, Fig. 1b. During the time the photon takes to travel between the mirrors, the truck moves foreward a distance *d'* proportional to its speed. Pythagoras' theorem and a little simple algebra show that the distance d_1 the photon now has to travel is *greater* than its stationary value d_0 by a factor γ:

---

[a] Speed being distance divided by time.

[b] His long-term university friend.

$$\gamma = \frac{1}{\sqrt{1-(\frac{v}{c})^2}} \qquad \text{(eq.1)}$$

called the *Lorentz factor* in honour of the Dutch physicist Hendrik Lorentz[a]. Fig. 3 shows the overall path of the truck B photon through space.

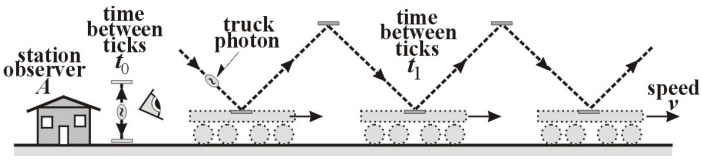

Fig. 3. Clock slowing (2).

The speed of light *c* being constant[b], the truck clock B *ticks more slowly* than the station clock A by the Lorentz factor γ. Meaning that *times* measured on it are *shorter* than those on the station clock by the same amount.

At low truck speeds *v*, the Lorentz factor γ is approximately unity and can be ignored. But at relativistic speeds it increases rapidly, becoming infinite at the speed of light *c*[c], Fig. 4.

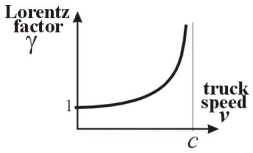

Fig. 4. Lorentz factor.

Clock absurdity (1)

If a travelling observer's clock runs more slowly, so also by implication do for him physical events in general. Meaning that he *ages less* than when at rest. Einstein wrote in 1911:

> "A living organism placed in a box, after a lengthy flight at approximately the speed of light, could return in a scarcely altered condition, while corresponding organisms on Earth had long since given way to new generations."[7]

In the same year Paul Langevin[d] put this into its better known *twin form*, Fig. 5. Twin A is an earthbound homebody and twin B is an astronaut. Twin B undertakes

---

[a] Hendrik Lorentz (1853-1928), Dutch physicist.

[b] The 1st 'relativity' postulate (p.2).

[c] Where *v*=*c* and the bottom line of the Lorentz factor (eq.1) becomes zero.

[d] Paul Langevin (1872–1946), French physicist.

a spaceship journey at near to the speed of light, returning to find he is younger than his earthbound brother.

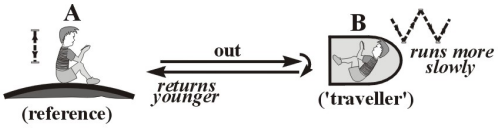

Fig. 5. Twins.

The same applies to two twins in spaceships free-floating in outer space, Fig. 6. The reference twin A sees the travelling twin B's clock running more slowly than his own.

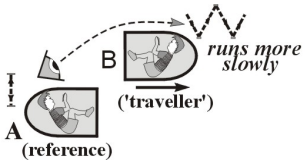

Fig. 6. Twin A's view.

Relative to twin B, however, *twin A* is the 'traveller'. Meaning that for twin B it is *twin A's* clock that runs slower, Fig. 7. Because both twins are moving inertially, according to the first 'relativity' postulate[a] both their viewpoints are equally valid, effectively correct.

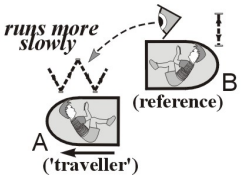

Fig. 7. Twin B's view.

Logical consequences of Einstein's two postulates are therefore that:

– 1) two observers in relative motion each see the other's clock running slower than his own
– 2) both perceptions are correct

This is the essence of the clock absurdity. Being rationally contradictory, so on the philosophical *reductio ad absurdum* principle are the Einstein postulates, and by extension Special Relativity itself. The absurdity is resumed in Fig. 0-8.

---

[a] p.2.

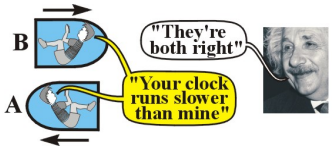

Fig. 0-8. Clock absurdity (1).

The clock absurdity alone is sufficient to falsify Special Relativity. Experimental refutations, of which there are many[a], are interesting but superfluous. A logical contradiction cannot correspond to physical reality. One doesn't need experiment to show that there are no square circles. Special Relativity is its own *reductio ad absurdum*:

Special Relativity is its own reductio ad absurdum

To say that Special Relativity can be correct, is like saying that there can be square circles[b][8]

Formatado: Fonte: 10 pt

Bibliography

(cited works only)

Einstein, A. (1905) *On the Electrodynamics of Moving Bodies* (Annalen der Physik 17 (10): 891–921)
------ (1911) "Die Relativitäts-Theorie". *Naturforschende Gesellschaft, Zürich, Vierteljahresschrift* 56: 1–14
------ (1916) *Relativity: The Special and General Theory* (London: Methuen)
------ (1919) *What Is The Theory Of Relativity?* (London Times, 28/11/1919)
------ (1922) *How I Created the Theory of Relativity* (Physics Today, Vol. 35, No.8, pp. 45-47)
Fiennes, J. (2019a) *The Aether* (www.jeremyfiennes.com)
----- (2019b) *EinsteinsTerribleTwins* (www.EinsteinsTerribleTwins.com)

[1] Einstein 1905.
[2] Einstein 1919.
[3] Einstein 1905.
[4] Einstein 1916.
[5] Fiennes 2019a, p.11.
[6] Einstein 1922.
[7] en.wikipedia.
[8] Fiennes 2019b.

[a] Starting with the 1887 Michelson-Morley experiment (p.2, note).
[b] The historical and social background to all this is discussed in a companion article.