Special Relativity

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Special Relativity

There is this one thing about *special relativity* that always bothered me. It's claimed there is no absolute reference frame and that everything is relative with respect to two arbitrarily chosen frames and that light has the same velocity in all frames. It takes not much to come up with a paradox in this concept that takes Einsteins work of 1905 apart. Here it goes:

There are two siblings, one stays on earth, the other gets into a rocket, flies around for a while and eventually returns to earth. It turns out that the sibling that stayed on earth got grey hair in the meanwhile while his flying sibling remained young and coltish. This effect is known as time dilatation and can doubtlessly be demonstrated with two atomic watches, one stationary on earth and another on board of a space shuttle orbiting earth. The annoying young physicist now argues if everything is relative why can't we consider the flying rocket to be stationary and the earth with the sibling be moving? If looked on it that way the other sibling should have aged, shouldn't he!?

This classical siblings paradox is usually discussed away with the argument that the flying sibling is accelerated twice and that therefore special relativity does not apply. The obvious paradox is promised to be resolved (later) by general relativity. This argument does not hold for at least two reasons:

- It is easy to claim something is thoroughly explained by just another theory that is too complex to be ever understood by the majority of graduating students. It took Einstein many years to learn tensor algebra and formulate his theory of general relativity. The reference to a mysterious theory only a hand full of people on earth are able to fully comprehend is not of very much help. It's like saying: "Kid, you are too stupid to understand this. Shut up!"
- It can easily be shown that the effect has nothing to do with acceleration. Letting the sibling in the rocket fly around twice the time will make the stationary sibling age twice as much. This again can simply be confirmed with atomic watches, one on earth, another one in a satellite and clearly shows that the effect is caused by the duration of relative movement and not due to one being accelerated. Myon decay is another famous example for time dilatation in which no participant is accelerated (just relative movement with more or less constant velocity).

What other possibly more intuitive concept can we come up with that predicts the observed data? Let's assumes 3D space to be filled with aether and consider an apparatus consisting of a light source, a mirror and a light sensor to be at rest with respect to such aether. Let's further assume that light propagates with velocity c in this all permeating medium. The light source and the sensor are mounted next to each other, the mirror is fastened vertically above the assembly at distance d. It takes the light beam

$$t_0 = \frac{2d}{c} \tag{1}$$

to reach the mirror and get back down to the light sensor. We now consider the apparatus to be horizontally moving with velocity v with respect to the assumed aether medium. The light beam then has to cover the distance

$$s = \sqrt{d^2 + \left(\frac{vt_v}{2}\right)^2} \tag{2}$$

to reach the mirror and another distance

$$s = \sqrt{d^2 + \left(\frac{vt_v}{2}\right)^2} \tag{3}$$

to get back to the sensor that has moved to another location in the meanwhile. The total time for one tick of the moving apparatus is given by

$$t_v = \frac{2s}{c} \tag{4}$$

Substituting Eq. 4 into Eq. 3 gives us

$$\begin{aligned} \frac{t_v c}{2} &= \sqrt{d^2 + \left(\frac{vt_v}{2}\right)^2} \\ \left(\frac{ct_v}{2}\right)^2 &= d^2 + \left(\frac{vt_v}{2}\right)^2 \end{aligned}$$

$$\begin{aligned} \left(\frac{ct_v}{2}\right)^2 - \left(\frac{vt_v}{2}\right)^2 &= d^2 \\ {t_v}^2 \left(\left(\frac{c}{2}\right)^2 - \left(\frac{v}{2}\right)^2\right) &= d^2 \\ t_v \sqrt{\left(\frac{c}{2}\right)^2 - \left(\frac{v}{2}\right)^2} &= d \end{aligned}$$

and after substituting Eq. 1 into this equation

$$\begin{aligned} \frac{t_v}{2}\sqrt{c^2 - v^2} &= \frac{t_0 c}{2} \\ t_v &= \frac{t_0 c}{\sqrt{c^2 - v^2}} \end{aligned}$$

$$t_v = \frac{t_0}{\sqrt{1 - \frac{v^2}{c^2}}}$$

Here we come up with the same term relativists call time dilatation without strange and non-intuitive assumptions, without having to wonder what time in which reference frame means. All we assumed were absolute time and space and that light propagates with constant velocity with respect to an all permeating aether (medium). The result predicts the observed time dilatation without a siblings paradox.

Nikola Telsa in 1905 after reading Einsteins publication said: "This will throw us back 100 years!". It turns out he was wrong. In the meanwhile 110 years have past and relativity is still preached at universities.

Another wise man said: "A true scientists holds every proposition with a light grasp, ready to surrender it upon receiving *new evidence* or *better arguments*!"

Isn't it time to get rid of moldered and proven to be wrong concepts? :-)