the general science journal

Discovering Relativity's Achilles' Heel

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Abstract
This article investigates an inconsistency in the limit being expressed in relativity's equations for time dilation, length contraction, etc.

Keywords
Relativity, Time Dilation, Limit, Reciprocal, Ratio of Velocities

Consider relativistic equations such as

$$t = t_1\ [1/(1- v^2/c^2)^{½}],$$
$$L_1 = L\ [1/(1- v^2/c^2)^{½}],$$

and $E = m_o\ c^2\ [1/(1- v^2/c^2)^{½}]$.
Note, all these equations have the quantity $1/(1- v^2/c^2)^{½}$ in common. This quantity is regarded as the mathematical expression of the theoretical limit that no moving object v can equal the velocity of light c (that v must be less than c).
To understand why this is, take the quantity $1/(1- v^2/c^2)^{½}$ and try setting v equal to c. In this instance, the ratio of v^2/c^2 would be one to one. Now, you can see what happens if you substitute this one to one ratio of v^2/c^2 into the quantity $1/(1- v^2/c^2)^{½}$.

$$1/(1 - 1/1)^{½}$$
$$1/(1 - 1)^{½}$$
$$1/0$$

Setting v equal to c results in the quantity attempting to divide one by zero. Of course, as division by zero is not allowed in mathematics, in the quantity $1/(1- v^2/c^2)^{½}$ it is then mathematically impossible for the velocity of a moving object v to equal the velocity of light c.
However, before accepting this as a true limit, check the reciprocal. That is, it should be possible to move the quantity $1/(1- v^2/c^2)^{½}$ from one side of an equation to the other without affecting the limit. To test this theory, begin with relativity's equation for time dilation.

$$t = t_1\ [1/(1- v^2/c^2)^{½}]$$

Divide both sides of this equation by the quantity $1/(1- v^2/c^2)^{½}$.

$$t\ /\ [1/(1- v^2/c^2)^{½}] = t_1\ [1/(1- v^2/c^2)^{½}]\ /\ [1/(1- v^2/c^2)^{½}]$$
$$t\ /\ [1/(1- v^2/c^2)^{½}] = t_1$$
$$t\ (1- v^2/c^2)^{½} = t_1$$

In other words, simply multiply both sides of the equation by the reciprocal of $1/(1- v^2/c^2)^{½}$, that is, $(1- v^2/c^2)^{½}$.

Now check to see if the limit remains the same in this reciprocal equation.

$$t\ (1- v^2/c^2)^{½} = t_1$$

Again, set v equal to c so that the ratio of v^2/c^2 is one to one. Now substitute this one to one ratio for v^2/c^2 into the equation:

$$t\,(1- 1/1)^{½} = t_1$$
$$t\,(1- 1)^{½} = t_1$$
$$t\,(0) = t_1$$

You can see this reciprocal form of the time dilation equation presents a dilemma. As multiplication by zero is allowed in mathematics, here the ratio of v^2/c^2 can equal one: Meaning, in this form of the equation, the velocity of a moving object v can equal the velocity of light c!

So the question is, if moving the quantity $1/(1- v^2/c^2)^{½}$ from one side of the equation to the other changes the limit (concerning the velocity of a moving object relative to light), can the quantity, or its reciprocal, be expressing a valid limit?

Conclusion
When examining the quantity $1/(1- v^2/c^2)^{½}$ as a mathematical limit, some questions arise. First, if the quantity $1/(1- v^2/c^2)^{½}$ is expressing a valid mathematical limit, shouldn't the quantity's reciprocal $(1- v^2/c^2)^{½}$ also express the same limit? Though the quantities $1/(1- v^2/c^2)^{½}$ and $(1- v^2/c^2)^{½}$ may be reciprocals in the sense that one can be multiplied by the other to produce a result of one, they are not reciprocals in the limits they respectively represent. Thus, as the quantity $1/(1- v^2/c^2)^{½}$ and its reciprocal $(1- v^2/c^2)^{½}$ do not maintain the fundamental property of equality (in terms of the limits they represent), both quantities would appear to be mathematically invalid for use in any equation.

Second, if the quantity $1/(1- v^2/c^2)^{½}$ or its reciprocal $(1- v^2/c^2)^{½}$ were mathematical expressions of a limit essential to the theory of relativity, wouldn't it be necessary for one (or the other) of these quantities be a part of every equation involving the theory of relativity? Compare the relativistic equations

$$t = t_1\,[1/(1- v^2/c^2)^{½}],$$
$$L_1 = L\,[1/(1- v^2/c^2)^{½}],$$
$$\text{and } E = m_o\,c^2\,[1/(1- v^2/c^2)^{½}],$$

to the equation that is supposed to epitomize the theory of relativity.

$$E = m\,c^2$$

The obvious question that comes to mind is, why is the limit $1/(1- v^2/c^2)^{½}$, so necessary to relativity, not ostensibly part of this signature equation? What is the limit being expressed by the equation $E = m\,c^2$?
In closing, the essential argument here is not addressing any theories involving the speed of light. What is being addressed is the mathematical validity of the quantity

$1/(1- v^2/c^2)^{½}$.
Considered strictly in a mathematical sense, as the quantity $1/(1- v^2/c^2)^{½}$ and its reciprocal $(1- v^2/c^2)^{½}$ do not express the same limit (whatever the limit may or may not be interpreted to be), can either be considered as mathematically valid for use in an equation?