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Evident Errors in the Theoretical Basis of Relativity Theory

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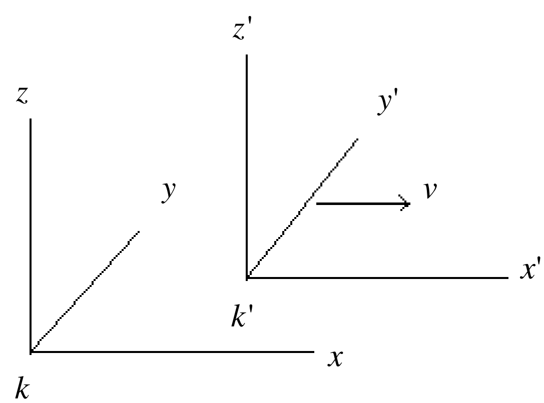
Abstract – This paper is based on Einstein's original book – Relativity: the Special and General Theory. We have added some commentary to the book citation regarding the existence of several evident errors in the derivations of the basis of relativity theory. Curiously relativistic physicists continue to state that the Lorentz's transformations verify Einstein's postulates when it is possible to clearly prove the contrary. We think, however, that relativity theory is partially correct as proven in experiments, but believe it is necessary to reformulate its theoretical basis.

Relativity: the special and general theory

(This book may be downloaded at http://wbabin.net/einstein.zip)

APPENDIX I

SIMPLE DERIVATION OF THE LORENTZ TRANSFORMATION
(SUPPLEMENTARY TO SECTION 11)



For the relative orientation of the co-ordinate systems indicated in Fig. 2, the x-axes of both systems permanently coincide. In the present case we can divide the problem into parts by considering first only events which are localised on the x-axis. Any such event is represented with respect to the co-ordinate system K by the abscissa x and the time t, and with respect to the system K1 by the abscissa x' and the time t'. We require to find x' and t' when x and t are given.

A light-signal, which is proceeding along the positive x axis is transmitted according to the equation,

$$x = ct$$

or

$$x - ct = 0 \quad . \quad . \quad . \quad (1).$$

Since the same light signal has to be transmitted relative to K1 with velocity c, the propagation relative to system K1 will be represented by the analogous formula,

$$x' - ct' = O \quad . \quad . \quad . \quad (2)$$

Those space-time points (events) which satisfy (x) must also satisfy (2). Obviously this will be the case when the relation,

$$(x' - ct') = l\,(x - ct) \quad . \quad . \quad . \quad (3).$$

is fulfilled in general, where l indicates a constant; for according to (3), the disappearance of (x - ct) involves the disappearance of (x' - ct').

If we apply quite similar considerations to light rays which are being transmitted along the negative x-axis, we obtain the condition,

$$(x' + ct') = \mu(x + ct) \quad . \quad . \quad . \quad (4).$$

By adding (or subtracting) equations (3) and (4), and introducing for convenience the constants a and b in place of the constants l and μ, where,

$$a = \frac{\lambda + \mu}{2}$$

and

$$b = \frac{\lambda - \mu}{2}$$

we obtain the equations

$$\left.\begin{array}{l} x^1 = ax - bct \\ ct^1 = act - bx \end{array}\right\} \quad . \quad . \quad . \quad (5).$$

We should thus have the solution of our problem, if the constants a and b were known. These result from the following discussion.

For the origin of K1 we have permanently x' = 0, and hence according to the first of the equations (5)

$$\mathbf{x} = \frac{bc}{a} t$$

If we call v the velocity with which the origin of K1 is moving relative to K, we then have,

$$\mathbf{v} = \frac{bc}{a} \qquad (6).$$

(Commentary:

We consider that all theoretical argumentation used by Einstein are wrong from the beginning but, for not permitting any doubts we only concentrate on the mathematically evident errors.

If $x' = 0 \quad \Leftrightarrow \quad ax - bct = 0 \quad \Leftrightarrow \quad x = \frac{bc}{a} t$

But $x' = ct'$ **so** $ct' = 0$

From the second equation (5) $act - bx = 0 \quad \Leftrightarrow \quad x = \frac{ac}{b} t$

Equalling both equations $\frac{bc}{a} t = \frac{ac}{b} t \quad \Leftrightarrow \quad a = b$

As $v = \frac{bc}{a} \quad \Leftrightarrow \quad v = c$

So this result doesn't allow the derivation of the Lorentz's transformations.

Or still $x = \frac{bc}{a} t$ **and** $v = \frac{bc}{a} \quad \Leftrightarrow \quad x = vt$

But $x = ct$ **so** $v = c$

Let's ignore this result and continue with the citation.)

The same value, v can be obtained from equations (5) if we calculate the velocity of another point of K1 relative to K, or the velocity (directed towards the negative x-axis) of a point of K with respect to K'. In short, we can designate v as the relative velocity of the two systems.

Furthermore, the principle of relativity teaches us that, as judged from K, the length of a unit measuring rod which is at rest with reference to K1 must be exactly the same as the length as judged from K', of a unit measuring rod which is at rest relative to K. In order to see how the points of the x-axis appear as viewed from K, we only need to take a "snapshot "of K1 from K; this means that we have to insert a particular value of t (time of K), e.g. t = 0. For this value of t, we then obtain from the first of the equations (5) x' = ax

Two points of the x'-axis which are separated by the distance Dx' = I when measured in the K1 system are thus separated in our instantaneous photograph by the distance,

$$\Delta x = \frac{I}{a} \quad . \quad . \quad . \quad (7).$$

But if the snapshot be taken from K'(t' = 0), and if we eliminate t from equations (5), taking into account expression (6), we obtain,

$$x^1 = a\left(I - \frac{v^2}{c^2}\right)x$$

From this we conclude that two points on the x-axis separated by distance I (relative to K) will be represented in our snapshot by the distance,

$$\Delta x^1 = a\left(I - \frac{v^2}{c^2}\right) \quad . \quad . \quad . \quad (7a).$$

But from what has been said, the two snapshots must be identical; hence Dx in (7) must be equal to Dx' in (7a), so that we obtain,

$$a = \frac{I}{I - \frac{v^2}{c^2}} \quad . \quad . \quad . \quad (7b).$$

(Commentary:

Once more we consider that all ideological argumentation results in a big confusion. Let us concentrate on the mathematical expressions:

$t = 0$ **and** $x' = ax - bct \quad \Leftrightarrow \quad x' = ax$

but $x = ct$ **so** $x = 0 \quad \Leftrightarrow \quad x' = 0$

as $ct' = act - bx$ **so** $t' = 0 \quad \Leftrightarrow$

$$\Leftrightarrow \quad a = \frac{0}{0}$$

Again and again Einstein ignores his initial statement $x = ct$ **and** $x' = ct'$**. Let's ignore this error.**

$$t = 0 \quad \Leftrightarrow \quad x' = ax \quad \Leftrightarrow \quad \Delta x = \frac{\Delta x'}{a}$$

but $\Delta x' = 1 \quad \Leftrightarrow \quad \Delta x = \frac{1}{a}$

also $t' = 0$ **and** $ct' = act - bx \quad \Leftrightarrow \quad t = \frac{bx}{ac}$

$t = \frac{bx}{ac}$ **and** $x' = ax - bct \quad \Leftrightarrow \quad x' = ax\left(1 - \frac{b^2}{a^2}\right)$

but $v = \frac{bc}{a} \quad \Leftrightarrow \quad \frac{b}{a} = \frac{v}{c}$ **so** $x' = ax\left(1 - \frac{v^2}{c^2}\right)$

thus $\Delta x' = a\left(1 - \frac{v^2}{c^2}\right)\Delta x$

but $\Delta x = 1 \quad \Leftrightarrow \quad \Delta x' = a\left(1 - \frac{v^2}{c^2}\right)$

therefore as $\Delta x = 1$ **and** $\Delta x = \frac{1}{a} \quad \Leftrightarrow \quad a = 1$

as $\Delta x' = 1 \quad \Leftrightarrow \quad v = 0$

Again we didn't reach the derivation of the Lorentz's transformations. Einstein also states that $\Delta x' = \Delta x$, but we all know that

$$\Delta x' = \Delta x\sqrt{1 - \frac{v^2}{c^2}}$$

Let's continue)

Equations (6) and (7b) determine the constants a and b. By inserting the values of these constants in (5), we obtain the first and the fourth of the equations given in Section 11.

$$\left.\begin{aligned} x' &= \frac{x - vt}{\sqrt{1 - \frac{v^2}{c^2}}} \\ t' &= \frac{t - \frac{v}{c^2}x}{\sqrt{1 - \frac{v^2}{c^2}}} \end{aligned}\right\} \quad . \quad . \quad . \quad (8).$$

Thus we have obtained the Lorentz transformation for events on the x-axis. It satisfies the condition,

$$x'^2 - c^2t'^2 = x^2 - c^2t^2 \quad . \quad . \quad . \quad (8a).$$

The extension of this result to include events which take place outside the x-axis,is obtained by retaining equations (8) and supplementing them with the relations,

$$\left.\begin{array}{l} y' = y \\ z' = z \end{array}\right\} \quad . \quad . \quad . \quad (9).$$

In this way we satisfy the postulate of the constancy of the velocity of light in the vacuum for rays of light of arbitrary direction, both for the system K and for the system K'. This may be shown in the following manner.

We suppose a light-signal sent out from the origin of K at the time t = 0. It will be propagated according to the equation,

$$r = \sqrt{x^2 + y^2 + z^2} = ct$$

or, if we square this equation, according to the equation,

$$x^2 + y^2 + z^2 = c^2t^2 = 0 \quad . \quad . \quad . \quad (10).$$

It is required by the law of propagation of light, in conjunction with the postulate of relativity, that the transmission of the signal in question should take place -- as judged from K1 -- in accordance with the corresponding formula

$$r' = ct'$$

or,

$$x'^2 + y'^2 + z'^2 - c^2t'^2 = 0 \quad . \quad . \quad . \quad (10a).$$

In order that equation (10a) may be a consequence of equation (10), we must have,

$$x'^2 + y'^2 + z'^2 - c^2t'^2 = s\,(x^2 + y^2 + z^2 - c^2t^2) \qquad (11).$$

Since equation (8a) must hold for points on the x-axis, we thus have, s = I. It is easily seen that the Lorentz transformation really satisfies equation (11) for s = I; for (11) is a consequence of (8a) and (9), and hence also of (8) and (9). We have thus derived the Lorentz transformation.

The Lorentz transformation represented by (8) and (9) still requires to be generalised. Obviously it is immaterial whether the axes of K1 be chosen so that they are spatially parallel to those of K. It is also not essential that the velocity of translation of K1 with respect to K should be in the direction of the x-axis. A simple consideration shows that we are able to construct the Lorentz transformation in this general sense from two kinds of transformations, viz. from Lorentz transformations in the special sense and from purely spatial transformations, which correspond to the replacement of the rectangular co-ordinate system by a new system with its axes pointing in other directions.

Mathematically, we can characterise the generalised Lorentz transformation thus:

It expresses x', y', x', t', in terms of linear homogeneous functions of x, y, x, t, of such a kind that the relation,

$$x'^2 + y'^2 + z'^2 - c^2t'^2 = x^2 + y^2 + z^2 - c2t^2 \qquad (11a).$$

is satisfied identically. That is to say: If we substitute their expressions in x, y, x, t, in place of x', y', x', t', on the left-hand side, then the left-hand side of (11a) agrees with the right-hand side.

(Commentary:

$$\begin{cases} x' = \dfrac{x - vt}{\sqrt{1 - v^2/c^2}} \\ t' = \dfrac{t - vx/c^2}{\sqrt{1 - v^2/c^2}} \end{cases} \quad \textbf{removing v} \quad \Leftrightarrow \quad x'^2 - c^2t'^2 = x^2 - c^2t^2$$

$$x = ct \quad \Leftrightarrow \quad x^2 - c^2t^2 = 0 \qquad \textbf{and} \qquad x' = ct' \quad \Leftrightarrow \quad x'^2 - c^2t'^2 = 0$$

$$\textbf{or} \quad t = \frac{x}{c} \qquad \textbf{and} \qquad t' = \frac{x'}{c}$$

that means the time t is a function of x and not an independent coordinate as appears in the expression of space-time:

$$\begin{cases} x^2 + y^2 + z^2 - c^2t^2 = 0 \\ x = ct \end{cases} \quad \Leftrightarrow \quad y^2 + z^2 = 0$$

Thus, we prove that the space-time equation is in error because that equation states that time is independent of space. If time is a function of space, something is wrong!)