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Einstein's simple derivation of Lorentz transformation: a critique

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Einstein made numerous math mistakes, his Special relativity (SR) is a collection of math mistakes, and modern physics still uses that collection of mistakes to teach physics students adding extra mistakes as it goes. So the issue is to try to emphasis one specific mistake among his many which makes it clear that existing SR is a farce needing revision.

Einstein gives a simple derivation of the Lorentz transformation, and he makes the following mistake buried within it:

for $x^2 = c^2 t^2$

the square root of this equation is x = +ct or –ct

to emphasis that there are two solutions it would be best to say

$x_1 = +ct$ for the first solution
and
$x_2 = -ct$ for the second solution.

if we add x_1 to x_2 we get +ct – ct =0, but Einstein's attitude is too casual with his use of math and does not separate the two solutions so when he should be adding things like x_1 to x_2 he treats merely as adding x to x and gets 2x

i.e. he gets 2x when he should be obtaining 0.

It is this bad attitude to math that Einstein has, and he just makes numerous math mistakes of this and worse, so that what he has is just a collection of math mistakes, and that is supposed to be his theory SR.

Let's have a look at a simple derivation of the Lorentz transformation by Einstein [1] with my comments –

Einstein: 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 *k′* by the abscissa *x′* and the time *t′.* when *x* and *t* are given.

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

x = ct

or
x –ct =0 (1)

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

x' - ct' =0 (2)

Those space-time points (events) which satisfy (1) must also satisfy (2). Obviously this will be the case when the relation

(x' –ct') = lambda (x –ct) (3)

Me: Not very impressive is 0 =0

Lambda = some number

0 = Lambda *0

Einstein: …….is fulfilled in general, where lambda 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) (4)

Me: ah this is bad he means $x^2 = c^2 t^2$
And $x'^2 = c^2 t'^2$

So that x has two solutions: ct and –ct
x' has two solutions ct' and –ct'

He should really be saying something like $x_1 = ct$ and $x_2 = -ct$

$x'_1 = ct'$ and $x'_2 = -ct'$

He makes a confusion here by having x as both ct and –ct
x' as both ct' and –ct'

We shall bear this in mind as we proceed

For (4) we have 0 = mu*0

Also not very impressive

Einstein: By adding (or subtracting) equations (3) and (4), and introducing for convenience the constants *a* and *b* in place of the constants lambda and mu where

a = (lambda + mu)/2

and b = (lambda –mu)/2

Me: lambda and mu could be anything, so a and b could be anything

Einstein: …we obtain the equations

Me: he adds (3) and (4) and gets

x' = ax –bct
But this is incorrect what he really has is

$(x'_1 - ct')$ = lambda $(x_1 - ct)$

And

$(x'_2 + ct')$ = mu $(x_2 + ct)$

Add these two together and we have:

$(x'_1 + x'_2 - ct' + ct') = \text{lambda}(x_1 - ct) + \text{mu}\,(x_2 + ct)$

LHS (left hand side) = $(x'_1 + x'_2) = 0$ because $x'_1 = ct'$ and $x'_2 = -ct'$

While bear in mind RHS (right hand side) is still = 0

So we have 0=0

But he gives $x' = ax - bct$ as if it means something when it doesn't; it means nothing. All he was doing was manipulating 0 =0 and then he made a mistake and got something he erroneously thought meant something when it doesn't. Poor confused guy, and for a laugh "they" told him he was a genius.

It completely invalidates his theory building upon bad math such as this.

Louis Essen a very highly respected experimental physicist (awarded Popov Gold Medal of the USSR Academy of Sciences, OBE etc) noted that Einstein's Relativity (SR) was full of mistakes and had this to say [2] :

"But there have always been its critics: Rutherford treated it as a joke; Soddy called it a swindle; Bertrand Russel suggested that it was all contained in the Lorentz transformation equations; and many scientists commented on its contradictions."

i.e many eminent scientists have noted that Einstein's SR is full of contradictions.

- these are the "elite" of the intellectuals.

But for some very bad reason these criticisms have been ignored, and publicity has been spent by advertisers with lots of money portraying Einstein as a genius, so the mess he made of math gets taught to generations of physics students.

i.e publicity advertising propaganda of Einstein as a genius has corrupted physics, replacing "real" investigations into physics with math mess fostered onto us by this propaganda.

References

[1] see Appendix
[2] Relativity joke or swindle
http://www.ekkehard-friebe.de/Essen-L.htm

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Appendix

Albert Einstein's Simple Derivation of the Lorentz Transformation

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 *k′* by the abscissa *x′* and the time *t′*. when *x* and *t* are given.

A light-signal, which is proceeding along the positive axis of *x,* is transmitted according to the equation
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x' - ct' =0 (2)

Those space-time points (events) which satisfy (1) must also satisfy (2). Obviously this will be the case when the relation

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

is fulfilled in general, where λ 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

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

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

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

and

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

we obtain the equations

$$\left. \begin{aligned} x' &= ax - bct \\ ct' &= act - bx \end{aligned} \right\} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (5).$$

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 *k'* we have permanently *x'* = 0, and hence according to the first of the equations (5)

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

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

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

The same value *v* can be obtained from equation (5), if we calculate the velocity of another point of *k'* 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 *k'* 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 require to take a "snapshot" of *k'* 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 *x'*=1 when measured in the *k'* system are thus separated in our instantaneous photograph by

the distance

$$\Delta x = \frac{1}{a} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (7).$$

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

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

From this we conclude that two points on the x-axis and separated by the distance 1 (relative to K) will be represented on our snapshot by the distance

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

But from what has been said, the two snapshots must be identical; hence Δx in (7) must be equal to $\Delta x'$ in (7*a*), so that we obtain

$$a^2 = \frac{1}{1 - \frac{v^2}{c^2}} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (7b).$$

The equations (6) and (7*b*) 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 XI.

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

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

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

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

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

In this way we satisfy the postulate of the constancy of the velocity of light *in vacuo* 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

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

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 *K'*—in accordance with the corresponding formula

r’ = ct’

or,

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

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

$$x'^2 + y'^2 + z'^2 - c^2t'^2 = \sigma(x^2 + y^2 + z^2 - c^2t^2) \quad (11).$$

Since equation (8*a*) must hold for points on the x-axis, we thus have $\sigma = 1$; for (11) is a consequence of (8*a*) 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 *K'* be chosen so that they are spatially parallel to those of *K*. It is also not essential that the velocity of translation of *K'* 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 corresponds 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', z', t',* in terms of linear homogeneous functions of *x, y, z, t,* of such a kind that the relation

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

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