thegeneralscience journal

Special Relativity: system of mistakes

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Special Relativity (SR) is a theme I keep coming back to as something that needs radical correction of its mistakes, because SR maths is a collection of mistakes.

1. Lets start a fresh looking at the maths of SR:

Standard SR maths looks at the equations:

$$x^2 + y^2 + z^2 - c^2 t^2 = 0$$

$$x'^2 + y'^2 + z'^2 - c^2 t'^2 = 0$$

equating gives:

$$x^2 + y^2 + z^2 - c^2 t^2 = x'^2 + y'^2 + z'^2 - c^2 t'^2 = 0$$

and gives the transformation between the two equations as:

$$t' = \text{gamma}\ (t - vx/c^2)$$
$$x' = \text{gamma}\ (x - vt)$$
$$y' = y$$
$$z' = z$$

if we subst $y' = y$ and $z' = z$ into the previous equation we have :

$$x^2 + y^2 + z^2 - c^2 t^2 = x'^2 + y^2 + z^2 - c^2 t'^2 = 0$$

we can then subtract $y^2 + z^2$ from both sides leaving :

$$x^2 - c^2 t^2 = x'^2 - c^2 t'^2 = 0$$

And this is the case we will now consider namely :

$x^2 - c^2 t^2 = 0$ (1)

$x'^2 - c^2 t'^2 = 0$ (2)

with the Lorentz transformations as:

$t' = \text{gamma}\ (t - vx/c^2)$ (3)
$x' = \text{gamma}\ (x - vt)$ (4)

With the issue now to find what gamma is.

i.e. Let us accept that for the moment, and look at the issue of discovering what gamma equals.

if we subst (3) and (4) into (2) we get equation (1) as required.

Now let us try using 1/gamma instead of gamma, so that we have:

$t' = (1/\text{gamma})\ (t - vx/c^2)$ (3b)
$x' = (1/\text{gamma})\ (x - vt)$ (4b)

i.e. subst (3b) and (4b) into (2) we also get equation (1).

Which means that both gamma and 1/gamma works.

In fact gamma could equal anything.

There is no reason to choose one particular possibility of gamma over another.

So we can conclude gamma = 1/gamma therefore equals "1" as follows:

In order to get (3) = (3b) and (4) = (4b) we need gamma = 1/gamma.

For gamma greater than 1 then 1/gamma is less than one; which translates into (3) and (4) as x' greater than x and t' greater than t, while in (3b) and (4b) x' less than x and t' less than t.

It is not possible for x’ to be greater than x and also less than x simultaneously, so requirement is gamma = 1/gamma. (similarly for t’ and t, can’t have t’ greater and less than t simultaneously.) This results in the simplest solution as just treat gamma as equal to 1.

We have thus:

$t' = (t - vx/c^2)$ (3c)
$x' = (x - vt)$ (4c)

as the transformations acting on :

$x^2 - c^2 t^2 = 0$ (1)

$x'^2 - c^2 t'^2 = 0$ (2)

This is of course contrary to what SR texts have, but as explained their maths is wrong.

The issue is tied into other maths mistakes, because SR texts do not stay with just making one mistake, they make a collection of maths mistakes. Being a collection of maths mistakes it can be difficult for some people to see just the one maths mistake, because their faulty thinking is dealing with maths in a context of believing lots of maths mistakes.

A maths mistake that can make it difficult to see that (3c) and (4c) is the solution of (1) and (2) is tied into the issue of inverse transformation as I will now go into:

2. Inverse transformation

First we need to go into detail about what the following means:

$t' = (t - vx/c^2)$ (3c)
$x' = (x - vt)$ (4c)

as the transformations acting on :

$x^2 - c^2 t^2 = 0$ (1)

$x'^2 - c^2 t'^2 = 0$ (2)

What it means is that (3c) and (4c) is the mathematical solution posed for what is the transformation between (1) and (2).

After not properly understanding that - most relativists want to jump into finding the inverse transformation namely from (2) to (1), and in that context most of them do it wrong, and by doing it wrong falsely then exclude (3c) and (4c) as solution of transformation from (1) to (2).

So some explanation needs to be gone into as to what the maths we have at present means.

We have two frames of reference- the unprimed frame of x, t and the primed frame of x', t'.

To make it easier it might be best to think there are observers in both frames, so there is observer A in unprimed frame x, t and observer B in primed frame x', t'

The assumptions used are of Principle of Relativity and the constancy of light speed.

Which means that if A observes B moving at velocity -v then B observes A moving at velocity +v (i.e in the opposite direction), and that both A and B observe lightspeed = c.

For observer A he has in his frame x, t light travelling as per equation (1):

$$x^2 - c^2 t^2 = 0 \quad (1)$$

light travels distance x in time t with speed c.

Now A looks at the light in the primed frame, and the primed frame is moving at velocity -v, he then says as per equation (4c):

$$x' = (x - vt) \quad (4c)$$

primed frame distance x' is my distance x less vt, since by (1) he has x = ct this equation becomes :

$$x' = (c-v)t$$

i.e distance x’ is traversed by light travelling distance ct less vt, because the primed frame is moving relative to me as – v.

To clarify things it might be as well to put subscript A to everything in equations (1), (2), (3c) and (4c)

$t_A' = (t_A - vx_A /c^2)$ (3d)
$x_A' = (x_A - v\, t_A)$ (4d)

as the transformations acting on :

$x_A^2 - c^2 t_A^2 = 0$ (1a)
$x_A'^2 - c^2 t_A'^2 = 0$ (2a)

i.e. this transformation is now in relation to observations made by observer A.

It might be that you can guess my next step, namely place everything in connection to observations made by observer B:

Namely:

$x_B^2 - c^2 t_B^2 = 0$ (1b)

$x_B'^2 - c^2 t_B'^2 = 0$ (2b)

For these equations we want the observations of observer B in the primed frame x’, t’ related to the unprimed frame by some transformation.

This has been the failure point in the maths mistake by the relativists for the inverse transformation of not properly considering the observations made by two different observers.

Equation (1a) is the observation frame of observer A:

$x_A^2 - c^2 t_A^2 = 0$ (1a)

Equation (2b) is the observation frame of observer B:

$x_B'^2 - c^2 t_B'^2 = 0$ (2b)

What A observes as the distance traversed in the primed frame is not what B observes from the primed frame; because A observes the primed frame as moving while B observes the prime frame as stationary.

Similarly what B observes as the distance traversed in the unprimed frame is not what A observes in the unprimed frame, because B observes the unprimed frame as moving and A observes it as stationary.

This subtle point about the differences of what A and B observe has been profoundly messed by relativists. Hence the need for the subscripts A and B to highlight what A observes as x is not what B observes etc.

We now translate that into the maths:

observer A observes $x = ct$ not $x' = ct$
observer B observes $x' = ct'$ not $x = ct$

for the first case , without the subscripts:

observer A observes $x = ct$ not $x' = ct$

we have already obtained: observer A observes
$x = ct$ and $x' = (c-v)t$

we need now to do the same thing for observer B

observer B has $x' = ct'$ observes velocity in opposite direction so has $x = x' + vt' = (c+v)t'$

$x = ct$ of A is not the same as $x = x'+vt'$ of B

hence the need for subscripts, so rewriting with subscripts:

observer A observes $x_A = ct_A$ not $x' = ct_A$

we have already obtained: observer A observes
$x_A = ct_A$ and $x_A' = (c-v)t_A$

we need now to do the same thing for observer B

observer B has $x_B' = ct_B'$ observes velocity in opposite direction so has
$x_B = x_B' + vt_B' = (c+v)t_B'$

It is this confusion of mistaking x_A and x_B as being the same thing when really they are different that has been at the root of many of the mistakes.

Recap:

Observer A in his rest frame observes light travel $x_A = ct_A$ in the unprimed frame.
But observer B observes the unprimed frame as moving, which A does not. etc.

That then explains the mess that was made with inverse transformations.

Having made that mess, relativists then set about making the mess bigger by introducing gamma as being non-unity.

i.e they don't correct the mistakes that they make, instead they just add more mistakes to the mistakes they have already made.

We now need to return to the forward transformation:

3. Time

The forward transformation we have as :

$t' = (t - vx/c^2)$ (3c)
$x' = (x - vt)$ (4c)

as the transformations acting on :

$x^2 - c^2 t^2 = 0$ (1)

$x'^2 - c^2 t'^2 = 0$ (2)

i.e the transformation according to the observer A (we have dropped use of subscript A for time being).

By (1) we have x = ct as positive solution this into (3c) and (4c) gives:

$t' = (t - vxct/c^2) = (1 - v/c)t = (c-v)t/c$ (3c1)

$x' = (ct - vt) = (c - v)t$ (4c1)

$t' = (c - v)\, t / c$ (3c1)

$x' = (c - v)t$ (4c1)

subst (3c1) and (4c1) into (2) :

$$(c - v)^2 \; t^2 - c^2 \; (c - v)^2 \; t^2 / c^2 = 0$$

$$(c - v)^2 \; t^2 - (c - v)^2 \; t^2 = 0$$

i.e $(c - v)^2 \; t^2 = (c - v)^2 \; t^2$

in other words $x'^2 = (c - v)^2 \; t^2$

we could write $c'^2 = (c - v)^2$ then

$x'^2 = c'^2 \; t^2$ instead of $x'^2 = c^2 \; t'^2$

Dare I say it – if we instead accept light speed as variable instead of having t' different to t, then we have recovered Newtonian physics with its variable light speed.

And indeed that is what we do, recover that part of Newtonian physics with its universal time.

The introduction of non-universal time was just caused by the other mess needing more mess added; untangle all the mess and we are back to universal time.

Instead of writing the transformation

$t' = (c - v)\, t / c$ (3c1)

$x' = (c - v)t$ (4c1)

acting on :

$$x^2 - c^2 \; t^2 = 0 \quad (1)$$

$$x'^2 - c^2 \; t'^2 = 0 \quad (2)$$

It would have been more appropriate to have written :

$$x^2 - c^2 \; t^2 = 0 \quad (1a1)$$

$$x'^2 - c'^2 \; t^2 = 0 \quad (2a1)$$

and tried to find the transformation for (1a1) - (2a1)

But that was not what was done instead the transformation was sought for (1)-(2).

4. Re-starting inverse transformation investigation

There are several things I could do now, I could go back to part 2 and correct for the mistake that is pointed out in part 3; but instead I will carry on from part 2.

What we have from part 2 is-

$t_A' = (t_A - v\, x_A / c^2)$ (3d)
$x_A' = (x_A - v t_A)$ (4d)

as the transformations acting on :

$x_A^2 - c^2 t_A^2 = 0$ (1a)
$x_A'^2 - c^2 t_A'^2 = 0$ (2a)

i.e. this transformation is now in relation to observations made by observer A.

observer B has $x_B' = c\, t_B'$ observes velocity in opposite direction so has

$x_B = x_B' + v t_B' = (c+v) t_B'$

this acts on transforming (2b) to (1b) along with
$t_B = (t_B' + v\, x_B'/ c^2)$ for :

$x_B^2 - c^2 t_B^2 = 0$ (1b)
$x_B'^2 - c^2 t_B'^2 = 0$ (2b)

writing this out more neatly :

$x_B = x_B' + vt_B' = (c+v)t_B'$ (1e)

$t_B = (t_B' + v\, x_B'/c^2)$ (2e)

is the transformation in relation to observer B changing (1b) into (2b)

$x_B^2 - c^2 t_B^2 = 0$ (1b)
$x_B'^2 - c^2 t_B'^2 = 0$ (2b)

We should now check that out:

$x_B = x_B' + vt_B'$ changed into $x_B = (c+v)t_B'$ by using $x_B' = c\, t_B'$

i.e. observer B in primed frame is stationary with respect to that frame and claims distance x_B' traversed by light travelling at speed c in time t_B' .

we can make this subst in (2e) also and we obtain:

$t_B = (t_B' + v\, c\, t_B'/c^2)$
$= (1 + v/c)\, t_B' = (c + v)\, t_B'/c$

subst this into (1b) we obtain :

$(c+v)^2 t_B'^2 - c^2 (c+v)^2 t_B'^2/c^2$

$= (c+v)^2 t_B'^2 - (c+v)^2 t_B'^2 = 0$

and we note that this is indeed zero as required.

we can write as:

$(c^2 + v^2 + 2vc)\, t_B'^2 - (c^2 + v^2 + 2vc)\, t_B'^2 = 0$

we could remove the

$(v^2 + 2vc)\, t_B'^2 - (v^2 + 2vc)\, t_B'^2$ part and that would leave us just :

$(c^2)\, t_B'^2 - (c^2)\, t_B'^2 = 0$

subst $c^2\, t_B'^2$ as $x_B'^2$ for its first use and we have :

$x_B'^2 - c^2\, t_B'^2 = 0$

which is equation (2b).

So we have transformed equation (1b) into equation (2b) as required by this transformation.

i.e we have shown the forward transformation works and the inverse transformation works, and all of this with gamma as unity contrary to its non-unity value used in standard SR texts.

A point to note is that this transformation does look a bit strange:

because when we have it as:

$(c^2 + v^2 + 2vc)\, t_B'^2 - (c^2 + v^2 + 2vc)\, t_B'^2 = 0$

and compare it to :

$x_B'^2 - c^2\, t_B'^2 = 0$ (2b).

it does look like that maybe $x_B'^2$ equals $(c^2 + v^2 + 2vc)\, t_B'^2$ which would be more than $x_B'^2 = c^2\, t_B'^2$ and that $(c^2 + v^2 + 2vc)\, t_B'^2$ equals $c^2\, t_B'^2$ which would be more than $c^2\, t_B'^2$. But what we have is $(v^2 + 2vc)\, t_B'^2 - (v^2 + 2vc)\, t_B'^2 = 0$ and when we re-arrange we can get the equation:

$(c^2 + v^2 + 2vc)\, t_B'^2 - (c^2 + v^2 + 2vc)\, t_B'^2 = 0$

into the form:

$x_B'^2 - c^2\, t_B'^2 = 0$ (2b).

If we were talking of what we were doing here with this transformation we might talk of it as part of spatial dimension being swapped with part of temporal dimension and vice-versa; it's the sort of thing that relativists sometime talk about when then they do their transformations in 4 dimensional space-time and in part is an artefact of abandoning universal time in standard SR texts; if universal time were reinstated then it would probably look more sensible. And is another reason why the culmination of mistakes made in SR maths has confused many relativists into making further mistakes.

5. Conclusion

So it is just amazing this mess of maths mistakes that Einstein built upon. Instead of correcting the mistakes, more mistakes were added until most relativists get confused under the mountain of maths mistakes and just accept them.

And you can see my method—it is the recovery of Newtonian physics from SR, with every step and every reason for Einstein and/or SRists for further development of their SR being a maths mistakes.

i.e. whenever SRists encounter a problem with development of SR from the basic foundations of SR and then proposes a solution such as time dilation, length contraction or whatever else - this is deemed as adding a mistake, rather than accept that SR maths is in error from the very beginning of its foundation.

Reference

see related:

Correct Derivation Of Lorentz Transforms Eliminates Contradictions Of Einstein's Relativity, by Harry H. Ricker III : ttp://www.wbabin.net/physics/ricker1.htm

SRists = Special relativists

c.RJAnderton2009-09-03