

## Special Relativity's Contradiction in Two-Three Dimensions, Part 2

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**Abstract:** *In this paper, we perform a mathematical analysis of the self-compatibility of Einstein's<sup>1</sup> axioms and self guessed definitions of Special Relativity (S.R.), never done previously by Einstein, nor by the literature. In particular, We find a major mathematical contradiction, which refers to "inertial" frames of reference of Special Relativity. S.R. is the theory concerned exclusively with inertial frames, and how information is passed from one inertial frame to another inertial frame, with the so-called Lorentz transformations, in the root of S.R. Though, for the one dimension, the theory has no contradiction for inertial frames, however, for two or three dimensions though, S.R. does so.*

*Therefore, S.R. can not theorize or analyze with no contradiction in the above two or three dimensions. S.R. in the literature systematically considers only the one-dimensional configuration. Generally, it is inaccurate, saying two inertial frames move with constant velocity. Inertial frames are actually frames without the so-called inertial forces and might move in two or more dimension.*

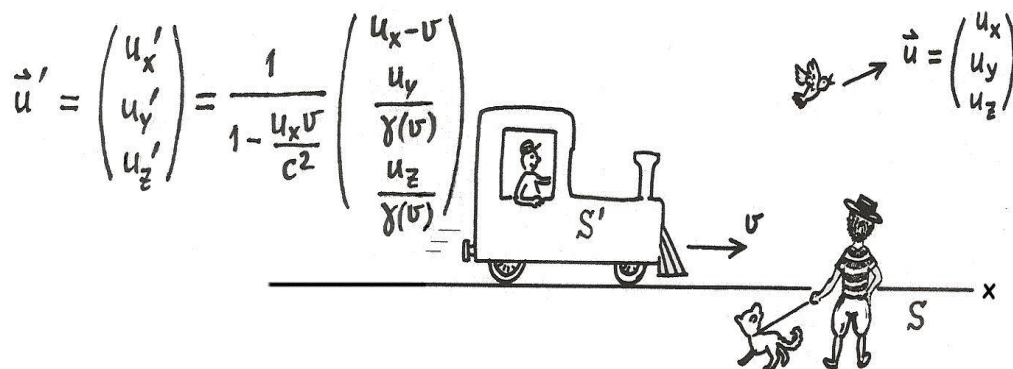
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Einstein and the following him literature were not giving definitions to their terms which they used. For example, the Euclidian concept of parallelism, which S.R. makes overwhelming use, is not defined in S.R.. S. Relativity incorporates specific axioms and is borrowing definitions from other, as well as the axioms and definitions of Mathematics and specifically Euledian geometry. So, S.R. is a theory with a high number of axioms and definitions that are not defined by S.R.

An axiomatic theory has to establish the compatibility of its axioms and definitions by trial and error. Relativity is hard to test, having a big number of axioms and definitions not explicitly stated by S.R. but borrowed and guessed definitions from other non relativistic theories. It took us several years, working persistently, to investigate whether Einstein was lucky or unlucky, with his choices of axioms and so for the implied definitions, and produced a Mathematically compatible and non contradictory theory, which Einstein took for granted, that his axioms and so implied-guessed definitions were compatible and automatically blessed by God, not to be self-contradictory, whatever they were. He had never bothered to investigate<sup>1</sup> them, neither the following him literature has done something about this Mathematical issue, which is called "Mathematical combatibility."

Finally, after the said "hard work of several years" we investigated all these cases, we produced here in this paper a very simple proof, showing a self-inherent incompatibility exists for Special Relativity, for a 2 or 3-dimensional space. Though, characteristically for the one-dimensional linear space, S.R. does not seem to be incombatile and contradictory.

The relativity transformations are usually only for the special case of motion in one space direction, usually that of x!



**Fig1. No size consideration by S.R.** Bird (approximating a point), a man S (having height) with dog, and train S' (having length and height) are usually considered by S.R. as consisted of one point each, that is totally 3 points: A, B, C. The three points A, B, C, also called the corresponding observer's frame. A frame occupies the entire Universe, as its three axes go to  $\pm\infty$ . However, three times the entire Universe is considered by S.R. as 3 points A, B, C!

Relativity does not realize that a reference frame occupies the entire Universe with the frame axes  $x, y, z$  going to  $\pm$ infinity and the time  $t$  from the beginning of time to the end time. Relativity<sup>1</sup> makes the following basic velocity assumption-axiom for the velocity  $w$  of two frames, A seeing frame B, with velocity  $w$ , and frame B seeing frame A with velocity  $-w$ . Velocities  $w, -w$  are opposite to each other. Frames possess infinite many points. In S.R. no reference of which point of frame A to which point of frame B and vice versa, corresponds, the velocities  $w$  and  $-w$  generally, wrongly correspond to any pair of chosen points of frame A and of frame B, correspondingly. It is correct if S.R. guesses, that the velocities  $w, -w$  concern the beginning of frames A and B. For other different points of frames, velocities

$V_{AB}: A \rightarrow B$ , and  $V_{BA}: B \rightarrow A$ , are in general:

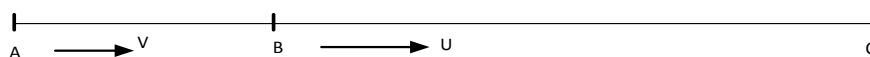
$$V_{AB} \neq -V_{BA} \tag{1}$$

Lorentz transformations being dictated by the Mathematical strict requirement for Lorentz transformations to have a parameter  $v$ , called the relative velocity, as well as for the inverse transformations a parameter  $-v$  called the opposite relative velocity. S. Relativity adopted the generally wrong assumptions: that is the opposite of relation (1) to become a complete reality, but contradictory the same time, theory. For visualizing this claim, see Fig. 3. In the literature most of the times, the **safe** one-dimensional configuration, usually that of  $x$  is used, for which (1) is specifically not valid:

$$V_{AB} = -V_{BA} \tag{1'}$$

This principle also comes to S. Relativity from the assumed wrongly equivalence of all points of two inertial frames. Note: the magnitude of the relative velocity of two frames 1, 2, is not of the same magnitude, only for two sets of points with each set on each frame, with points **collinear** parallel to the referred relative velocity of the two inertial frames. For visualizing this claim again, see Fig. 3.

**MOTION IN ONE LINE-X OF NO-CONTRADICTION**



**Fig2. Linear Position and linear velocity configuration.** Motion in a straight line, with  $v: A \rightarrow B$  and  $u: B \rightarrow C$  results in  $w: A \rightarrow C$  and by changing the signs of  $u$  and  $v: -u: C \rightarrow B, -v: B \rightarrow A$  results  $-w: C \rightarrow A$ .

From **Lorentz addition of velocities** for this case of Fig. 2, we have the following conclusions:

Let  $w: A \rightarrow B \rightarrow C$ , then  $v \oplus u := u \oplus v = (v+u)/(1-vu/c^2)\gamma(v)$ , where the symbol " $\oplus$ " signifies the Lorentz addition of velocities see Ref. 4.

Let  $-w: C \rightarrow B \rightarrow A$ , by changing the sign of  $v$  and  $u: -u \oplus -v := -w =$

$(-u-v)/(1-vu/c^2) \gamma(-v)$ , for  $\gamma(v) = \gamma(-v)$ , which indicates:

$w = v \oplus u: A \rightarrow C$ , via B. Also  $-w = (-u) \oplus (-v): C \rightarrow A$ , via B and obviously in a straight line, joining them. Therefore, for only, this linear case:

$$v \oplus u = -(-u) \oplus (-v) \tag{1}$$

In general, see also Ref. 4, it is:

$$v \oplus u = -(-u) \oplus (-v), \text{ but}$$

in general also Ref.4, not on a straight line joining them:

$$v \oplus u \neq u \oplus v \tag{2}$$

This one dimension case follows without contradiction.

### 3D CONTRADICTION

Einstein for his Special Theory of Relativity did not define the Geometry of an inertial or a non-inertial frame. It is silently assumed: the Geometry is for the entire space of our Universe, and this space is Euclidian. Even, the very concept of an "inertial frame of reference" or a "non-inertial frame of reference" should be defined as the "orthogonal normal Cartesian frame" without or with, correspondingly, the so-called: "inertial forces", such as the forces which throw us backwards or forwards in an accelerating or braking car, or when the car throws us leftward or rightward when it turns right or left. Also, in a "non-inertial frame" such as it is the Earth, we have the existence of the inertial forces: the "Coriolis forces", the inertial forces that cause the "tides in the sea" or the inertial forces that cause the "Foucault phenomenon", Ref. 6, etc. In any way, inertial frames should not be defined as the ones traveling with the wrong constant velocity. They should be defined, as above, in terms of the non-existence of the "inertial forces." Paradoxically the Earth rotating and thus having the centripetal acceleration and from it having inertial forces see Foucault pendulum, active Coriolis forces, inappropriate frame of S.R. However Earth's frame ironically and hypocritically is wrong as non inertial, is used to test S.R. Consider the hypocritical CERN claiming unscientifically and arbitrarily, that verifies every day S.R.

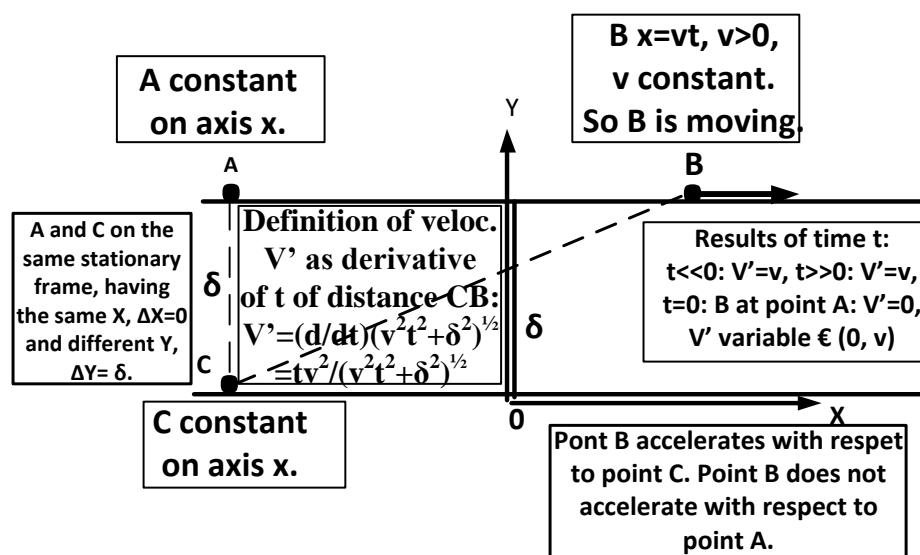
In general, Ref.4 and Fig.3, A,B,C are parallel inertial frames and their origins

Not on a straight line joining them it follows:  $v \oplus u \neq u \oplus v$ . The following vector (in matrix form) equation, Fig. 1 is found in all relevant books, for the equal in magnitude and opposite in direction velocities for each other observer. Each A and C frame is calculating his velocity via B frame respectively, see the Fig 2, 3 "ABC" diagram, for which the resultant relative velocities for A with respect C, should according to S. Relativity, be found constant, the same in magnitude and opposite:  $\mathbf{W}$ ,  $-\mathbf{W}$ , for each other frame "A" and "C", respectively. However, as we shall see below, these velocities will not be found constant and  $\mathbf{W}$ ,  $-\mathbf{W}$ , producing a Mathematical paradox and contradiction, and which we are presenting here for the first time for Special Relativity. We have  $v \oplus u \neq u \oplus v \rightarrow -(v \oplus u) \neq -(u \oplus v)$  Equ. 2 and Fig. 3, also

$$(-u) \oplus (-v) = -(u \oplus v) = -\mathbf{w} \neq v \oplus u = \mathbf{w} \tag{3}$$

The result (3) also shows  $-\mathbf{w} \neq \mathbf{w}$ . This makes a contradiction to Einstein's relative assumption:  $-\mathbf{w} = \mathbf{w}$ . Also, it makes the 3D contradiction and paradox. Q.E.D.

This case also results in changing velocities  $V'$  of inertial frames, from 0 to  $v$ , for  $x$  from  $-\infty$  to 0 to  $+\infty$ .  $V'$  is the derivaty of distance of BC that is its velocity, is  $(v^2t^2 + \delta^2)^{1/2}$  with respect to time  $t$ :  $(d/dt)(v^2t^2 + \delta^2)^{1/2} = tv^2 / (v^2t^2 + \delta^2)^{1/2}$ , A and B are inertial frames with relative supposed constant velocity  $v$ . A and C are on the same stationary frame. However, B with respect to C has a variable velocity, for  $t = -\infty$ :  $V' = v$ , for  $t = +\infty$ :  $V' = v$ , for  $t = 0$ , (B being at point A):  $V' = 0$ , thus  $V'$  is variable  $\in (0, v)$ . A and B belong to the same frame A. A, B and C are inertials frames, but B and C frames have a variable relative velocity. However, still all A, B, C to inertials, collapsing, thus, the inertiality concept of S.R. of A. Einstein, requiring all inertial frames have mutually each a constant relative velocity, contradiction!



**Fig3. 2-Dimensional case.** Differs from figure 2, that point B is raised up and point C lowered down left, making overall, a two-dimensional positional configuration of three points of A, B, C. Points A, C, are stationary and on the same vertical line: Y. Point B does not accelerate concerning point A. Point B accelerates concerning point C., making an inaccuracy-paradox for S.R., contradicting the relative velocity of C and B that is constant concerning S.R.

This general case contains a contradiction and paradox for S.R., for the constancy of relativistic velocities of frames in two or three dimensions. Indeed, the velocity of B with respect to A, is in general, **different** from the velocity of B with respect to C. The velocity  $V'$  is the derivative with respect to t of the distance CB: From the right triangle ABC, see Fig. 3, CB is the hypotenuse  $(v^2 t^2 + \delta^2)^{1/2}$ . Therefore, applying the Pythagorean theorem:  $CB^2 = AB^2 + CA^2$ :  $CB = \sqrt{[(AB^2) + (CA^2)]} = \sqrt{[v^2 t^2 + \delta^2]}$ :  $V' = dCB/dt = d(v^2 t^2 + \delta^2)^{1/2} / dt = tv^2 / (v^2 t^2 + \delta^2)^{1/2}$ , for  $t = -\infty$ :  $V' = v$ ,  $t = +\infty$ :  $V' = v$ ,  $t = 0$ , (points B, A on the same axis Y):  $V' = 0$ , therefore  $V'$  variable,  $V' \in (0, v)$ .

The one-dimensional configuration was generalized directly by Einstein, without sophisticated and responsible consideration at all, to the two, three dimensional configuration. For the equality of the two relative velocities of A with respect to C and vice versa, it should be true: The two opposite relative velocities should be on the **same line**, resulting only then in no contradiction and paradox, (This is only generally true for the linear case).

Note: This contradiction does not stand alone, independent of any other consequences of Special Relativity. For example, the Thomas precession<sup>7</sup> is problematic too, with the same inaccuracy. Moreover, we expect this inaccuracy should be extended to more subjects of Special Relativity and will be the subject of other papers.

**CONCLUSION**

**This Mathematical contradiction and paradox** indicate that Einstein ignores thorough and deep, Mathematics, though, he had presumably, a Mathematics bachelor degree, because he assumed for his theory "Special Relativity" in two or more dimensions, without investigating: that "two inertial observers located in such frames, at arbitrary points, see each other with in reality a **non-constant** in magnitude and opposite in direction velocities", contrary of the **constant** velocity that is wrongly assumed by S.R., with Einstein never checking the Mathematical consistency and copatibility of his assumptions-axioms for S.R..

**The Mathematical proof of this said contradiction** establishes a fatal error of the assumptions of S. Relativity of unknown and serious unexplored consequences, in particular, to the relative velocities  $V_1, V_2$  of two so-called ory frame, see each other, **not always move with constant, but  $V_1 \neq -V_2$** , contrary to what was naively and irresponsibly Einstein's assumption.

Generally, it is contradictory and paradoxical in saying, that two points on two inertial frames respectively, in two or more dimensions, move with constant velocity. Constant velocity may be Mathematically correct, only for points, **collinear** on a straight line paralel, for example, to x axis!. Constant "velocity" is a constant parameter of Lorentz Mathematical transformations of Special

Relativity, and the same parameter is used to produce Mathematically their inverse Lorentz transformations, but having no general correct physical meaning for the entire space of Universe occupied by the inertial frames, which was ignored by Einstein, who sacrificed accuracy to adopt the generally wrong axiom, that two inertial frames, obey Lorentz transformations, generally considering, opposite velocities for each other frame.

In particular, it is wrong for the usual saying: that S.R.'s general inertial frames move with generally constant and physically realistic velocities, for just being subject to Lorentz Mathematical transformations that make S.R.. S.R. is not generally experimentally tested<sup>5</sup> see also above (about CERN,) and has no accurate general meaning.

Finally, if we accept only **the one dimensional S. Relativity**, then it becomes **accurate and non-paradoxical**. However, then it becomes absolute and  $3 \times (1 \text{ space} + 1 \text{ time}) =$  a six total dimensional theory, see the first author's Ph.D. thesis<sup>8</sup>, which was written in 1979 by intuition and without knowing the above paradoxical results.

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