Strong Paradoxes Challenging the Foundation of Relativity Theory

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Abstract

This article reviews the famous Twin Paradox and Train (Trolley) Paradox in Special Relativity Theory (SRT), and makes modifications to them such that they immediately put SRT in obvious, unjustifiable contradiction. In sciences, both experimental observations and logic consistence have to be strictly respected, or the foundation of sciences is gone. Despite numerous claims that SRT complies with experimental observations, the logical contradiction of SRT has to be resolved. The indisputable paradoxes presented in this paper cannot be explained by any existing, sophistic arguments from relativity theory proponents (RPTs). Because of the simplicity and obviousness of these paradoxes, any high-school and college physics student with good logical sense or training can see the absurdity of such a theory. As such, the sophistic arguments involving Relativity of Simultaneity (RS) that were used in answering the original Twin Paradox and Train Paradox can no longer fool the naive, truth seeking students into believing a science of obvious contradiction. Since SRT is also the foundation of General Relativity Theory (GRT) and many other sciences (like Quantum Field Theory), this paper calls for immediate revision or abandonment of the whole relativity theory.

Key Words: Special Relativity, Twin Paradox, Train (Trolley) Paradox, Relativity of Simultaneity. Time Dilation, Length Contraction, Lorentz Transform, General Relativity.

1. Introduction

The most renowned science breakthrough in the past century has been attributed to Einstein's Relativity Theory (RT, [2][3][4]), whose foundation is SRT ([1][12]). RT is not born without criticisms and oppositions ([7]). But somehow, more and more experimental observations have been reported to "support" RT, and amazing scientific breakthroughs have been achieved out of RT, including atomic bombs and nuclear energy. As such, critical voices have been subdued and papers against RT can no longer be published in mainstream journals. This is a very sad tragedy and resembling the dark age of Galileo and Copernicus. This paper is one of a series papers that aim to correct the errors in modern physics and show that genuine sciences cannot accept any logical contradictions. Contradiction arises simply out of our ignorance of the truth, or out of imperfection of our knowledge organization. As such, contradictions cannot be ignored and should serve as the opening door to a more rigorous, perfect science.

Now that many experimental observations "support" RT, is it possible that some minor modifications of the RT will solve the contradictions arising from it? Unfortunately, more and more scientists in different disciplines find RT cannot explain the data and facts in their work. After more than 40 years pondering and researching on RT, my conclusion is no. RT has to be abandoned as a whole. Not only it is far away from the truth, it has no merits and beauty in

scientific formulation, because it is nonlinear and cannot handle rotation and acceleration easily. Onlysome of the results inspired from RT may stay valid as coincidences (such as Einstein's Mass-Energy Equation) . As a matter of fact, the most successful Quantum Mechanics is the one without SRT, and Quantum Field Theory also does not need SRT (though many physicists may not agree, but it is not critical for this paper here). In [10] and [11], assuming SRT is correct, we have proven that GRT cannot hold because photon's motion in a gravity field does not have the isotropy property that underlies GRT, and the redshift data from stellar observations used to support GRT can have alternative explanations. As such, GRT is not an indispensable theory in cosmology.

Just as we prove or disprove a claim in mathematics, this paper uses contradiction to disprove SRT. The classic Twin Paradox and Train Paradox have been answered by sophistic arguments ([8]) that involve Relativity of Simultaneity (RS) ([9]). There have published many paradoxes regarding RT, too many to list. We list only two references here ([5][6]). The additional paradoxes published by other scientists are either too complicated (such as involving rotation or multiple motions), or fail to resolve the Relativity of Simultaneity issue. To refute a false theory, a few strong paradoxes are good enough. The modified, but stronger paradoxes presented in this paper, directly ensure absolute simultaneity of measurements by making use of landmarks or bi-party events and hence make it impossible to (use RS sophistry) to resolve the contradictions embedded in SRT. Simultaneity can be ensured by preset event landmarks or a bi-party events (such as a collision) so that the sophistic argument of RS can no longer be used to defend SRT.

In order to make the discussions in this paper clear, let's summarize the basic assumptions and immediate consequences of SRT below.

Basic Assumptions of SRT ([1]-[4], [12]):
1. The laws of physics are invariant (i.e., same) in all inertial (i.e., with no acceleration) frames of reference.
2. The speed of light in vacuum is the same for all observers, regardless of the motion of the light source or observer.

Under these assumptions, SRT concludes the following immediate consequences from the Lorentz Transform (LT):
I. **Time Dilation**: Two observers A and B with relative velocity v to each other, would see each other's time is dilated by a factor of $\gamma = 1/\sqrt{1 - v^2/c^2}$, where c is the speed of light. That is, if t_A and t_B are the times in the clocks held and read by Observer A and B respectively, and t'_A and t'_B are t_A and t_B converted to the reference frames of Observer B and A, then
$$t_A = \gamma\, t'_B , \qquad t_B = \gamma\, t'_A . \tag{1}$$
II. **Length Contraction**: along the direction of the relative velocity v, two Observers A and B would see each other's length is contracted by a factor of γ. More precisely, assume Observer A and B each carries a stick of the same length (measured statically), and l_A and l_B are the lengths of their own sticks measured by Observer A and B respectively, and l'_A and l'_B are the lengths of the sticks held by Observer A and B but converted to the coordinates of Observer B and A, then
$$l'_B = l_A / \gamma , \quad l'_A = l_B / \gamma . \tag{2}$$
One interesting thing to note is that Equations (1) and (2) do not have much to do the history of

the motion of A or B, as long as the relative speed of them is constant within the measurement interval (time or space).

In this paper, we shall assume all the above assumptions and consequences in SRT are true, and then prove that contradictions arises. As a result, we have to conclude that at least one of the basic assumptions in SRT has to be wrong, and from our intuitions and numerous observations, we have to conclude that Assumption 2 above about light speed in SRT must be wrong.

How can Observer A measure the time or length of things that are travelling with Observer B, and vice versa? This is the Relativity of Simultaneity argument, because relativity theory proponents (RPTs) often use the difficulty in obtaining simultaneous measurements in two moving bodies so to escape the questioning of the paradoxes.

The classic Twin Paradox and Train Paradox were all evaded by a Relativity of Simultaneity argument, which in fact is a sophistic trick, so that the relativity theory survives to this date.

2. The Twin Paradox

In this section we shall first revisit the classic Twin Paradox and then do a slight modification, so that the sophistic answers from RTPs can no longer find any excuse to escape the contradiction.

The classic Twin Paradox ([8]) can be stated as follows. The twin sister Alice of Bob travels with a space ship and returns to Earth after many years, and then Bob finds that Alice is much younger. Because motion is relative, similarly, Alice also finds Bob much younger. How can this be? There were many answers from RTPs to avoid the paradox, all of them have to make use of a flaw in the classic Twin Paradox: at least one of the twins has to do acceleration/deceleration in the course before they can meet again. This acceleration/deceleration process altered the clocks and therefore the contradiction is avoided. Some defenses even gave accurate time changes by making assumptions about Alice's acceleration and deceleration ([8]).

In order to avoid acceleration and deceleration problem, let's modify the Twin Paradox a bit as in Fig. 1. Assume Alice and Bob all sit in a separate spaceship of exactly same design waiting at the two ends, A_0 and B_0, of a straight line respectively. A_0 and B_0 have equal distances to the center C on the line. Assume again in between A_0 and B_0, there are two other points A_1 and B_1 that also have equal distances to Center C. A_1 and B_1 are the points where Alice and Bob would all reach maximum and constant speed $|v/2|$ (with opposite direction) when their spaceships accelerate from their waiting start points A_0 and B_0, respectively.
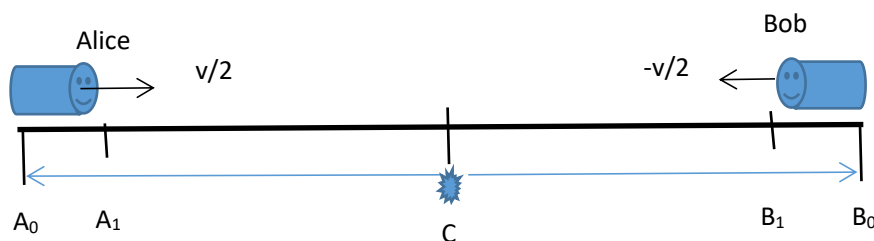

Fig. 1. Modified Twin Paradox

Now, assume Observer sits at Center C and gives starting light signals to both Alice and Bob at the same time. Because of equal distances, they would receive the signal at the same time and start their spaceship engine at the same time. When Alice reaches A_1 her spaceship would reaches maximum speed v/2, and when Bob reaches B_1, his spaceship would reach maximum speed -v/2, both at the same time as seen by Observer. The relative velocity between Alice and Bob is v, so that Equation (1) holds. Now, when Alice reaches A_1, she starts her clock and keeps her speed constant, and when Bob reaches B_1, he also starts his clock and keep his speed constant. According to Observer, both Alice and Bob start their clocks at the same time and the spaceship all reached constant and maximum speed |v/2| at either A_1 or B_1. Their staring times，in both the reference frames of Alice and Bob, are all 0 (hence equal), because they all start their clocks from 0。

When Alice and Bob meet at Center C, let's consider two situations.

In the first situation, when Alice and Bob meet at Center C, both would stop their clock, and then come down to compare with each other's. Now according to the Consequence of Time Dilation, Alice would see Bob's clock slower than hers, and Bob would see Alice's clock slower than his. How can that be? One may argue that stopping the clocks may change what the other party sees, then let's consider also the second situation.

In the second situation, when Alice and Bob meet at Center C, both will take a snap shot of the clock readings on her/his own clock as well as on the other. That means, Alice will have a clock reading t_A of her own clock and clock reading t'_B of Bob's clock, and Bob will have a clock reading t_B of his own clock and clock reading t'_A of Alice's clock. Now, because t'_A and t_A are on the same physical clock and t'_B and t_B are on the same physical clock, we must have
$$t'_A = t_A. \quad t'_B = t_B, \tag{3}$$
Now, according to (1) and (3), we must also have
$$t_A = \gamma\, t'_B = \gamma^2\, t'_A = \gamma^2\, t_A \quad \Rightarrow \quad \gamma^2 = 1 \quad \Rightarrow \quad \gamma = 1 \tag{4}$$
In the above equation we have used the fact $\gamma > 0$.
Now that $\gamma = 1$, this proves that there is no time dilation.

In the Modified Twin Paradox, with pre-measured distance, light signal, and landmark setting, we make sure Alice and Bob would start their clock at the same time with respect to a unbiased reference (Observer at the Center C) which sits at the their meeting point, and then they will meet and take snapshots of both clocks at the same time (secured by the same spot C). This way, the Relativity of Simultaneity no longer can be used to escape the contradiction. That means, Alice and Bob indeed start their clocks at the same time, and read their own clocks and each other's clocks at the same time with respect to a common reference. As a result, SRT cannot resolve the contradiction and must be wrong.

3. The Train Paradox
The Twin Paradox involve a starting time that may still be arguable by the RTPs. We now revisit the classic Train Paradox and then do a slight modification. A variant of the classic Train Paradox ([9]) can be stated as follows: when a Train of length L travelling at 0.8c speed enters a

Tunnel of length 0.9L, can the Tunnel shuts the whole Train inside the tunnel? Here length contraction factor is $\gamma = \sqrt{1 - 0.8^2}$ = 0.6. According to Equation (2), the train, seeing its own length as L, would see the tunnel have a length of 0.9L * 0.6 = 0.54L, while the Tunnel, seeing its own length as 0.9L, would see the Train have a length of 0.6L. Therefore, the Train would see the Tunnel too short to hold the whole train, while the Tunnel would see the Train shorter and therefore can be wholly put inside itself. Which is correct? Both derived their conclusions from the same Consequence of Length Contraction of SRT.

The RTPs again used the RS argument to escape the contradiction in the classic Train Paradox, because the classic version of the Train Paradox asks if the Train can be shut inside the Tunnel by the fences at the both ends of the Tunnel. Even so, some varied versions of this paradox use a controller sit in the middle of the Tunnel so to shut the two fences at the same time at a pre-calculated good timing. In the above variant, since we are not doing the action of shutting the fences at both ends of the Tunnel, but only take quick snap shots when the Train enters the Tunnel. Hence the Relativity of Simultaneity argument would have no excuse to be invoked. But again, it is uncertain at this point if they would accept this snapshot method for verifying whether the Train is completely inside the Tunnel.

In order to completely destroy the the hope of the RTPs of making SRT logically self consistent, we'll just need a little modification, so to make it impossible for the SRT to escape self contradiction.

4. The "Missile-Well" Paradox

We now modify the classic Train Paradox to the following Missile-Well Paradox as in Fig. 2. The Missile has two parts, Missile Head and Missile Tail. The Missile Head can enter the Well but not the Missile Tail. Both Missile Head and Well have a length of L when measured statically, and the Missile enters the Well at speed v = 0.8c, same as in the Train Paradox. The well has an open Well Mouth on the top of the Well and and a closed Well Bottom on the bottom of the Well. Two synchronized Meters A and B are set on Well Mouth and Well Bottom respectively, so to record the time of collision at both ends of the Well for comparison.
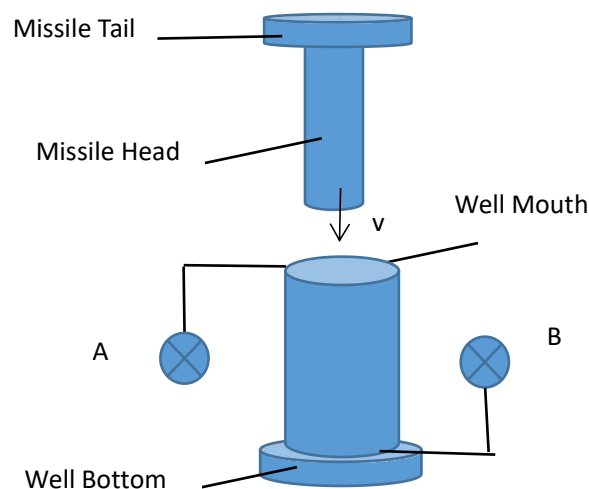

Fig. 2.

So, when the Missile enters the Well, if the Missile is longer, Meter B will record the collision first; if the Well is longer, then Meter A will record the collision first. So, in this case, which meter will record the collision first?

An observer on the Missile would see that the Well is shorter (only 0.6L) than the Missile, therefore, he would see that the Missile Head to hit the Well Bottom first. Since hitting is a bi-party event, that means Clock B will record the collision first. On the other hand, an observer on the Well would see that the Missile is shorter (only 0.6L), therefore, he would see that the Missile Tail to hit the Well Mouth before Missile Head can reach Well Bottom, meaning that Clock A will record the collision first. So which one is correct? As a third possibility, if there is no Length Contraction, then the collisions on Well Mouth and Well Bottom will happen at the same time. As a matter of fact, this Missile-Well Paradox can actually serve as a experiment design to be used to disprove SRT.

If we want uphold our logic principles used in all human wisdom and in all sciences, then we have to conclude that SRT is wrong.

That means, in the Missile-Well Paradox above, we resolved the Relativity of Simultaneity issue by measuring the collisions at the two ends of the Well with two synchronized clocks. This avoids any ambiguities or time discrepancies that may be associated with different observers. The events of collision happens simultaneously on both Missile and Well, just different end of the Well has collision first according to different observers, if Length Contraction were true.

5. Discussions

In addition to the paradoxes discussed in this paper, many other absurdities also arise out of SRT, such as the rotational asymmetry issue ([6][7]), and the absence of force and energy in length contraction. It is very surprised that RT escaped the scrutiny of so many bright scientists, students for more than 100 years. This is a unforgivable shame in the whole scientific history of human. The modified Twin Paradox and Missile-Well Paradox eliminate the Relativity of Simultaneity issue, and prove by contradiction that the Consequences of Time Dilation and Length Contraction must be wrong. As such, by the well established contradiction methodology, we conclude that the assumption of SRT regarding light speed must be wrong, and hence both SRT and GRT cannot be the true. If logic contradiction is allowed, then science is left only with a bunch of discrete facts and observations without a backbone.

To RT such an inspiring theory that has made great contributions to the progress of sciences and also deeply rooted in various sciences today, how can it be ruthlessly invalidated by a paper of only a few pages? Isn't it too harsh and rude to a great man like Einstein? Well, as Aristotle said, our respect to a great man should not surpass truth. To invalidate RT from the crown of physics, two major tasks need to be accomplished. First, we have to prove that such a theory is full of contradictions and cannot hold in sciences that are built on strict logic foundation. This paper serves to this goal. Secondly, the honesty and sincerity of other scientists have to be respected. As such, those experimental observations that "support" RT will all have to be re-examined, either finding out flaws in them, or re-explaining the data with an alternative theory without the

contradictions in RT. This is not a fantasy, but just requires a whole book and cooperation from numerous scientists from different disciplines. In my opinion, many of the experimental observations justifiable by RT can be explained by new theories without RT. Such a new theory is already on the road.

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