Replacing Einstein's Flawed Version of Relativity Theory by Incorporating Newton's Concept of Absolute Simultaneity

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Abstract

The Lorentz Transformation (LT), which is the cornerstone of Einstein's Theory of Relativity, is shown to lack internal consistency. Furthermore, his conclusion that the speed of light is the same relative to its source as it is for an observer in a different rest frame is untenable. It is also shown that the LT violates the Law of Causality by virtue of its space-time mixing characteristic. A Clock-rate Corollary to Newton's First Law of Motion is invoked to show that time and space are completely distinct entities, one measured with a clock and the other with a meter stick.. This leads to the development of the Newton-Voigt (NVT) space-time transformation as a replacement for the LT. It also provides the basis for the Uniform Scaling Method which allows for a completely objective theory of measurement.

Keywords: Law of Causality, Newton-Voigt Transformation, Uniform Scaling Method, Conversion Factors, Newton's First Law of Kinetics, Clock-rate Corollary, Classical Theory of Gravity

I. Introduction

It is widely believed that the theory of relativity introduced by Einstein in 1905 [1] is in full agreement with experimental evidence. Nevertheless, it is easy to show that it is fundamentally in error. The centerpiece of his theory is the Lorentz transformation (LT). The example of a measurement of the speed of light on a passing train demonstrates that reliance on the LT leads to a contradiction [2], which therefore shows conclusively that this space-time transformation is not viable. Einstein's version of the light-speed postulate has also been shown to be untenable [3].

Because of his belief in the LT. Einstein concluded that physical events which are simultaneous for one observer may not be so for another in a different rest frame [1]. In so doing, Einstein came in direct conflict with the views of Newton and coworkers. In this respect, it is important to note that Newton's First Law of Motion (Law of Kinetics) is consistent with the Law of Causality since it states that a body in constant motion will continue indefinitely at the same speed and direction until it is acted upon by some unbalanced external force. It is therefore also consistent with the Law of Causality to assume that the properties of a moving clock will remain the same indefinitely under the same circumstances (Clock-rate Corollary). The conclusion therefrom is that the LT is not consistent with the Law of Causality [4]. This is an important observation since it leads to the development of an alternative space-time transformation, the Newton-Voigt transformation or NVT, and also the Uniform Scaling Method.

Each of these points will be considered in the following discussion.

II. Incompatibility of Time Dilation and FitzGerald-Lorentz Length Contraction

Consider a train that is moving at constant speed v m/s past the station platform. A passenger on the train wishes to measure the speed of a light pulse. This is done in the standard way by measuring out a distance of L m on the floor of the train and then measuring the elapsed time T s that it takes for the pulse to travel between the two end points. He finds that the ratio has a value of L/T m/s = c m/s, where c has the value of 299792458 m/s prescribed by physicists, so everything has been done correctly.

This measurement has nothing directly to do with theory. Einstein predicted on the basis of the LT, however, that an observer on the platform would obtain the same value of L m if the pulse travelled in the same direction as the train. The value of the elapsed time would be equal to γ T s because of time dilation, whereby $\gamma (v) = (1-v^2c^{-2})^{-0.5}$. As a result, the platform observer obtains a different value for the speed of light, namely L/T m/s =c/γ m/s, which stands in contradiction to the value of c m/s predicted by the LT [1]. It is therefore proven that the LT is not internally consistent and is therefore invalid [2].

III. Distance Reframing Procedure

The next problem with Einstein's theory is his light-speed postulate. It states that the speed of a light pulse is the same relative to both the source of the pulse and the rest frame of an observer who is moving relative to the source. This prediction can be tested by considering how far the light travels in a certain time T. According to the postulate, the distance separating the light pulse from both the source and the observer is cT. .This is clearly impossible if the light source is moving with a constant speed v relative to the observer in the same direction as the light pulse, because the observer and the source are no longer located at the same position in space. They are in fact separated by a distance of vT.

The above technique of examining how far the light pulse moves relative to either rest frame is referred to as the *distance reframing procedure* [2]. It can be used in a different way that is most enlightening. After time T has elapsed, the light source has moved a distance of vT relative to the observer at the same time that the light pulse itself has travelled a distance of cT relative to the source. Again, if the light pulse is moving in the same direction as the source,

it follows that the total distance separating the light pulse and the observer is the sum of these two values, namely vT + cT. The corresponding speed of the light pulse is obtained in the standard manner by dividing the total distance by the elapsed time T, i.e. as c+v. This is the same value that is expected based on the classical (Galilean) velocity transformation or GVT. The latter designation is just a different name from what in more general usage is referred to as *the vector addition of velocities.*

It can clearly also be used for cases where the light pulse is traveling in a different direction than the source. Bradley employed the GVT in 1727 to explain the aberration of starlight at the zenith. It is an essential tool in astrophysical measurements. Because of the velocity v of the earth, a star which would be at its zenith is actually seen [5] at an angle α with the vertical with a value of $\tan^{-1}$ (v/c). In his 1905 paper [1], Einstein applied his light-speed postulate to this question and concluded that the exact value of the aberration angle is $\tan^{-1}$ (γv/c). Nevertheless, , as shown above, the proper method for computing this angle is to employ the GVT, and thus Bradley's result is preferred over Einstein's. Note, however, that the value of γ is on the order of only 10^{-8}. so it is impossible in practice to distinguish experimentally between the two results.

It needs to be pointed out, however, that there are situations where the GVT is inapplicable. In these cases the Relativistic Velocity Transformation (RVT) must be used instead [6]. The RVT was first derived by Einstein in his 1905 paper [1]. Experiments carried out in 1810 indicated that the speed of light in water c' satisfies the following relation [7] when it is passed through a tube containing water moving with speed v relative to the laboratory (n is the refractive index of water):

$$c' = c/n + v(1-n^{-2}).$$

According to the GVT, the speed should be equal to c/n + v. This result led to a frantic search for an "ether" which would serve as a rest frame for light waves analogous to that which is well known for sound. Michelson and Morley obtained a null effect in their experiment with light waves using their newly developed interferometer [8], which effectively put this idea to rest. Einstein also argued against ethers in his landmark paper. The RVT was subsequently applied to\ this "light-damping" experiment by von Laue [9] and he was able to obtain the above relationship quantitatively thereby.

The fact remains that the RVT cannot explain the effect detailed above comparing the values of the speed of light measured by two observers in relative motion to one another, whereas it is clear that the GVT is capable of doing this by virtue of the distance reframing procedure. Further consideration leads to the conclusion that the ranges of applicability for the RVT and GVT are mutually exclusive [6]. The GVT can be used to compare the speeds of light, or any other object, made at the same time by two observers *who are moving relative to another*; this means that the maximum relative speed of light is 2c, not simply c as the RVT would contend; this larger value is obtained when two light pulses approach each other in a straight line. By contrast, the RVT can be used to compare the speeds of light for two different speeds of the water traversing a tube; in this case the measurements must be made *by the same observer at different times.* It also can be used successfully to show that the speed of an electron cannot exceed a value of c when is acted upon by an electromagnetic field; in this case the two circumstances refer to measurements made prior to and after application of the field.

Finally, the results of the Michelson-Morley experiment [8] indicate that a suitable replacement for Einstein's faulty light-speed postulate is as follows. The speed of light in free space *relative to its source* is always equal to c; this includes light reflected from a mirror as the source.

IV. Newtonian Simultaneity and the Uniform Scaling Method

The search for a replacement for the LT is aided by taking account of Newton's First Law of Kinetics (Law of Inertia). It states that a body in motion will continue at the same speed and direction indefinitely until it is acted upon by some unbalanced external force. It is therefore consistent with the Law of Causality, namely that no physical change occurs spontaneously without something being responsible for that change. The latter has had a great influence on the development of scientific theories over the ages, so it is a curious fact of history that it is nowhere mentioned in Einstein's theory of relativity [1]. This can be done in a straightforward fashion by extending the applicability of Newton's First Law to cover the *properties of an object in uniform motion*. For example, this indicates that the rates of the inertial clocks that play a key role in the LT will not change unless acted upon by an unbalanced external force; such a conclusion amounts to the declaration of a "Clock-rate Corollary" to Newton's First Law.

The rates of two inertial clocks in different rest frames will generally not be the same. It is nonetheless clear that the *ratio Q* of these two rates must itself be a constant. This means in practice when the clocks are used to measure the elapsed time of a given event, or any time difference, the two values (Δt and $\Delta t'$) will always occur in this ratio, i.e.

$$\Delta t' = \Delta t / Q.$$

The relationship between Δt' and Δt in the LT [1], by contrast, is

$$\Delta t' = \gamma\,(v)\,(\Delta t - vc^{-2}\,\Delta x),$$

where v is the relative speed of the two rest frames along the x,x' axis and Δx is the distance between the two events from the vantage point of the "unprimed observer." This LT relation is the forerunner of the term "space-time mixing" which is a key ingredient of modern-day theoretical physics. It is therefore obvious that the LT is not consistent with the Law of Causality. It is also clear that if the two events are simultaneous for one observer, i.e. $\Delta t=0$, then they will not be so for the other (Δt') so long as both v and Δx are not equal to zero.

There is no such ambiguity in the case of the proportionality relation given first since it is clear that if $\Delta t'=0$, $\Delta t=0$ as well when it is applied. This is the result expected from Newton's standpoint. Furthermore, it is consistent with the Law of Causality. For this reason, the proportionality relation has been referred to in previous work as Newtonian Simultaneity [4].

A replacement for the LT is obtained by combining the above proportionality relation for Δt' and Δt with the RVT [10]. It serves as one of the latter's four equations. It can be obtained from the LT by multiplying each of its four equations on the right-hand side with $\eta/\gamma Q$ [note that $\eta = (1-vc^{-2}\Delta x\ \Delta t^{-1})^{-1}$ and also appears in the RVT in each of its three equations]. The latter transformation is referred to as the Newton-Voigt transformation (NVT).

In order to apply the NVT, it is clearly necessary to know the value of the parameter Q. This requires information from experimental investigations, such as have been carried out with circumnavigating atomic clocks [11]. The conclusion is that the elapsed time Δt measured on a given clock in motion is inversely proportional to γ (v), where v is the speed of the clock relative to a specific rest frame referred to as the Objective Rest Frame (ORS); this relationship is known as the Uniform Time-dilation Law (UTDL) [12]. When this relationship is combined with Newtonian Simultaneity, it is found that

$$Q= \gamma(v')/\gamma(v).$$

There is another interpretation of Newtonian Simultaneity that has very important consequences. This can be conveniently illustrated using the example of the train passing by the station platform in Sect. II.. In actuality, the elapsed times measured on the two clocks can be assumed to be exactly the same. In other words, measurement is *objective* in contrast to what is assumed in Einstein's theory [1]. The parameter Q, which is equal to $\gamma(v)$ according to the UTDL above if one takes the station platform as the appropriate ORS, can be looked upon as a *conversion factor* between the units of time employed in the two rest frames. In other words, the clock used on the platform simply runs faster than that used on the train by a factor of $\gamma(v)$.

On the other hand, the unit of speed can be assumed to be the same in both rest frames. The contradiction obtained by using the LT to predict the results that would be obtained on the platform can then be overcome by assuming that the conversion factor for the different distance measurements is also equal to $Q= \gamma(v)$. Consequently, when the platform observer computes his value for the speed of light, he simply takes his value of $\gamma(v)T$ for the elapsed time and divides it by the corresponding distance of $\gamma(v)L$ to obtain the desired result of $L/T=c$ for his determination. Note that, in contrast to the LT, the direction traveled by the light pulse on the train is immaterial since one assumes that the conversion factor is independent of the orientation of the light's motion relative to the platform.

Experiments with electrons undergoing acceleration in an electromagnetic field [13] showed that the increase in mass is also proportional to $\gamma(v)$. The indication is therefore that the conversion factor for inertial mass is also equal to Q. Since all other physical quantities can be expressed as products of the three fundamental properties of inertial mass, distance and time (mks system, for example), it follows that the conversion factor for each of them is always an integral multiple of Q. For example, the conversion factor for energy is also Q because it has a composition of inertial mass multiplied with the square of speed, as in $E=mc^2$; the factor for speed is $1=Q^0$ because it is defined as the ratio of distance to time, i.e. $Q/Q=1$. The conversion factor for angular momentum is Q^2 based on its composition of inertial mass, speed and distance $(QQ^0Q) = Q^2$. Note that the conversion factor for Planck's constant, which has the same unit as angular momentum, is also Q^2. In applying Planck's $E=h\nu$ energy/frequency relationship, one finds that the conversion factor is the same on both sides of the equation, namely Q for E and $Q^2\,Q^{-1}$ for $h\nu$. Note that the conversion factor for frequency is Q^{-1} since it is the reciprocal of time. This shows that if Planck's relation holds in one inertial frame, it will also hold in any other. This is true for all equations of physics.

V. Gravitational Scaling

There is an analogous procedure for scaling physical quantities which is based on gravitational interactions. In this case there is a parameter S which performs a similar role as Q does for kinetic acceleration. In his 1907 paper [14] in which he predicted the gravitational red shift of light frequencies emanating from the sun, Einstein introduced the concept of observers located in different gravitational potentials measuring different values for the same object. His argument combines the energy-mass equivalence relation with Newton's classical gravitational theory. Accordingly, if an observer at a higher potential measures the energy E of an object with inertial mass m to be mc^2, his counterpart at a lower potential will determine it to have a value $mgh + mc^2$, where g is the local acceleration due to gravity and h is the difference in heights of the two potentials. Einstein explained this by assuming that the *unit of energy* is different for the two observers. The appropriate conversion factor is thus determined to be $S= 1+ gh/c^2$. Consequently, the energy value at the lower potential will be found to be $S (mc^2) = mc^2 + mgh$. Note the similarity in this procedure and that employed for kinetic acceleration in Sect. IV. The assumption is that the energy of the object is actually the same for both observers. The factor S is a *conversion factor* for changing the numerical value obtained at the higher potential to its value in the unit employed at the lower potential.

As with kinetic scaling, the conversion factors for other physical properties are all integral multiples of the fundamental quantity, in this case S. Einstein concluded that S is also the conversion factor for speeds and frequencies [14,15]. The value of each property is determined by its composition. For example, the conversion factor for time is S^{-1} because time is the reciprocal of frequency; that for linear inertial momentum m is S^{-1} since it has the composition of energy/speed^2 (S/S^2). The conversion factor for distance is $1=Q^0$ since wavelength is the ratio of speed to frequency, i.e. S/S =1. The same is true for angular momentum (mvr).

The value of $S = 1 +ghc^{-2}$ is only valid for short vertical distances. The general value depends on the following A_i factors, which play a similar role to the γ (v) factors in kinetic scaling. They require knowledge of the distance r_i separating the object from the active mass and the value of the latter's gravitational mass m_0 (G is the Universal Gravitation Constant 6.6743x $10^{-11}Nm^2:kg^2$):

$$A_i = G\ m_0/c^2r_i.$$

The value of S is $1+A_o/A_p$ (o refers to the observer and p to the object). It reduces to the simpler version if $h=r_o-r_p$ is relatively small.

As a final remark in this section, there is strong empirical evidence from the circumnavigating atomic clock experiments carried out by Hafele and Keating [11] that the kinetic and gravitational effects are completely independent of one another. They were calculated separately and simply added together to obtain the final effect on the clocks at each phase of the journey. Consequently, it is useful to form combination scale factors Z for each property based on the corresponding kinetic and gravitational factors. For example, the Z factors for the fundamental properties of time, inertial mass and distance are Q/S, Q/S and Q, respectively. In the usual way, on the basis of the compositions of each quantity in terms of these three fundamental properties, one can easily determine the relevant Z factor for each property. For example, Z=QS for energy, Q^2 for angular momentum and Planck's constant, S for both speed and force, S^2/Q for acceleration and Q for both linear momentum and distance (Z=1for gravitational mass).

VI. Conclusion

The arguments presented above prove beyond a reasonable doubt that Einstein's version of relativity theory is fundamentally flawed. For example, it is perfectly clear that the light-speed equality postulate underlying the LT is incompatible with FitzGerald-Lorentz length contraction (FLC) and the time dilation effect. None of the three proofs given Sect. II-IV depends in any way on experimental developments that occurred since Einstein's landmark paper was published in 1905 [1]. On the contrary, they could have been deduced exclusively on the basis of details which were clearly evident at the time they were introduced. The LT is used as a premise for a logical argument which then leads directly to a contradiction. This is the standard method in mathematics to prove that a given theory is invalid.

This experience raises the question of why the LT and relativity theory are still widely believed to be perfectly valid. One answer has to with the fact that Einstein is an icon, not only in physics but among the general population as well. This is exemplified in justifications that are routinely given in applications for funding of major experimental projects. Quite often it is claimed, whether true or not, that the proposed work was suggested in pioneering studies carried out by Einstein many years previously. A concrete example of this subterfuge is the publicity supposedly supporting the existence of *gravity waves*. Typically, amounts in the hundreds of millions of dollars are requested, so this is not "small business." In this environment, it is the last thing physicists want to admit is that something as well-known as Einstein's theory of relativity has been shown to be unequivocally false. A concrete example of this attitude was recently provided by the editors of Physics Review Letters [16]. When presented with arguments of the nature discussed in the present work, the editors of this establishment journal refused to even submit these claims to their referees. They simply stated that the material was *not suitable for publication*, without giving any reason for their decision. This was done in lieu of any attempt whatsoever to debunk the arguments, that is, to try to defend the indefensible.

The other argument one hears is that there is no need for an alternative to Einstein's version of relativity theory, particularly one that does away with the LT. A closer look at the basis for this conclusion shows that the proponents have restricted their attention to experiments that rely on the RVT or Einstein's energy-equivalence relation, both of which are not in any way dependent on the LT. Under these circumstances, the sensible approach would be to eliminate those aspects of the old theory while at the same time preserving the parts that have proven validity. This is standard practice when attempting to correct an existing imperfect model with a new theory that retains the demonstrable successes of the latter. The present version accomplishes this goal by eliminating the LT and replacing it with NVT which is consistent with the Law of Causality and Newtonian Simultaneity. At the same time, it introduces the Uniform Scaling Method to provide an objective procedure for comparing the results obtained in different rest frames in their respective systems of units. In this context it is important to mention that the GPS navigation technique is wrongly believed to be consistent with Einstein's theory. In actuality, it was necessary for engineers to forego Einstein's claim of remote non-simultaneity in favor of absolute simultaneity predicted by the Uniform Scaling Method to accomplish their goal of having on-board clocks on orbiting satellites run at the same rate as their counterparts on the earth's surface.

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