The Long Debate

The Hidden Truth

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Abstract

Scientists have debated the issue of absolute velocity for five centuries. All attempts to measure or detect absolute velocity failed. A little over a hundred years ago one of the scientists had a magical moment. He came to the realization that a complete conspiracy of nature is itself a law of nature, and he concluded that the centuries of failures were simply due to a law of nature mandating that absolute velocity cannot be measured. Other scientists readily accepted his conclusion, and several of them stepped up to the plate and refined the conclusion by appending an obvious consequence involving space. In the early nineteen hundreds a consensus began to form in the scientific community that a law of nature exists mandating that absolute velocity **cannot be measured** and that absolute space **does not exist**. That consensus is stronger today than ever before. However, magical moments should never be trusted. This paper reveals a simple logic path proving mathematically that absolute velocity **can be measured** and that absolute space actually **does exist**. The revelation invalidates the law of nature panacea that scientists bought into over a century ago, and it exposes ramifications to Einstein's *Theory Of Relativity*.

1 Introduction

Newton believed[**1**] both space and time were absolute entities. He considered inertial velocity relative to space, which involved both space and time, to be absolute velocity. He stated that absolute velocity cannot be expressed in terms of the relative velocity of inertial bodies. Since he believed that relative velocity was the only distinguishing attribute of inertial bodies he declared that absolute velocity is invisible to the senses. Scientists have debated the issue of absolute velocity for five centuries, long before Newton's declaration and long afterward. They have tried repeatedly to discover some means for measuring or detecting absolute velocity. All attempts failed. The last straw was the failure of the famous *Michelson Morley* experiment[**2**] in the late eighteen hundreds. After that failure scientists began to accept Newton's view that absolute velocity is invisible to the senses. In 1904 Henri Poincaré proposed[**3**] that these failures were due to a law of nature, and he postulated a law of nature exists that mandates *It is not possible for absolute velocity to be measured or detected.*

Poincaré also proposed a corollary to the postulate[**4**], titled the *Principle Of Relativity* that mandated *The laws of physics are the same in all inertial frames of reference.* He reasoned that since a law of nature mandates that absolute velocity cannot measured or detected, there is no distinguishable difference between inertial bodies to justify applying physics laws differently to different inertial bodies. In 1905 Einstein presented essentially the same principle with different wording [**4**] titled the *Special Principle Of Relativity.* He declared it to be a postulate which combined with *The Constancy Of The Speed Of Light* postulate, formed the basis for his theory of relativity. He also declared the *Lorentz Transformation* equations to be the mathematical depiction of his theory.

Lorentz's equations pertain to two inertial bodies in empty space. The equations express that space and time of the two bodies is not the same, and that they differ as function of their relative velocity. Since Lorentz had derived his equations assuming one body to be at rest and the other in motion relative to space, he attributed the difference in their space and time to be due to the alteration of the moving body's space and time caused by its velocity relative to space, which he considered absolute space. However, Einstein adamantly declared there was no such thing as absolute space to be at rest in or in motion relative to, and that the difference in the two bodies' space and time[**7**][**8**] was simply due to their relative velocity .

These diametrically opposite viewpoints about absolute space were debated throughout the scientific community, and ever since the *Michelson Morley* experiment more and more scientists began supporting Einstein's point of view. Poincaré's position in the debate was unclear. He made multiple statements both for and against absolute space[**8**], but his *Principle Of Relativity*, which in essence Einstein adopted as the *Special Principle Of Relativity*, clearly supported the Einstein view against absolute space. In any case Einstein won the debate in the scientific community, and with the help of the famous physicist Max Planck[**4**] he propelled his belief against absolute space into the mainstream of twentieth century physics. Einstein was obviously aware that if absolute space did exist it would make inertial bodies distinguishable from each other, and that would invalidate the premise upon which his *Special Principle Of Relativity* was based, and would also invalidate his justification for applying his theory of relativity with reciprocity to any two inertial bodies.

However, all of these scientists including Lorentz, were totally unaware of an important mathematical fact regarding Lorentz's equations. Those five simple equations form the trail head of a logic path leading to the mathematical expression for the velocity relative to space of any inertial body in space, in terms of quantities measurable by that inertial body combined with quantities measurable by any two other inertial bodies. That mathematical expression proves that absolute velocity exists hence absolute space exists.

So Lorentz was right even though he lost the debate. And the flawed conviction by scientists that absolute space does not exist has resulted in scientists applying Einstein's theory of relativity incorrectly for over a hundred years.

2 Objective

The objective of this paper is to prove mathematically that absolute velocity and absolute space exist. The approach I chose for achieving the objective was to derive a mathematical expression for an inertial body's velocity relative to empty space, in terms of quantities measurable by that body and one or more other inertial bodies. Such an expression is an *Absolute Velocity Formula*.

The actual derivation of the formula is presented in **Section 5**. The description of the derivation and the logic leading to the derivation is presented here. Basically, the derivation was based on my belief that the differences in space and time for inertial bodies expressed by relativity equations like the *Lorentz Transformation*, should be measurable. This led me to derive an expression of absolute velocity in terms of measurable quantities which justified my belief. I began the endeavor by defining an inertial body as any group of bodies in the same inertial frame. With that definition if there were such a thing as absolute space, then every inertial body in space would have a unique velocity relative to space, and the mathematical expression of that velocity would be an *Absolute Velocity Formula*. I began the derivation with the *Lorentz Transformation*. It expresses the relationship of the spacetime coordinates of an arbitrary event in two different inertial frames as a function of the relative velocity between the two frames. Therefore deriving an expression for an inertial body's velocity relative to space would simply involve using the transformation to express the relationship of an arbitrary event pertaining to two inertial bodies, one at rest in space and the other in motion relative to space, and then solving for the relative velocity of the two bodies. Obviously, the relative velocity in such an expression would be an unknown, and there would be many other terms including multiple unknowns. I anticipated it would be necessary to apply the transformation multiple times to eliminate the unknowns.

I applied specificity to the above derivation plan, by defining spaceship captains Dick, Jane, and Mary as three inertial bodies in empty space who conduct measurements and engage in communication, and by defining God as a fourth inertial body who does not make measurements and does not engage in communication. I then followed a lengthy logic path involving the *Lorentz Transformation* culminating in an *Absolute Velocity Formula* expressing Jane's velocity relative to God in terms of quantities measurable by the three captains. Since Jane was representative of any inertial body in space, the formula pertains to all inertial bodies in space. And since the formula expresses a single unique value for each inertial body's velocity relative to God, means that God represents the one and only reference in space (the prime reference) that inertial velocity is measured relative to. Since the derivation involved multiple CS (coordinate systems) math clutter was a concern. Therefore I employed the same clutter reduction approach that Lorentz used with his transformation equations. I assumed all CS axes were parallel, I assumed all clocks were zeroed at an initializing moment when all CS coincided, and I assumed the three captains' relative velocity to be parallel to Jane's x axis.

3 The Terminology Used

There are four different CS involved so it's important to understand the following terminology in order to follow the logic of the derivations.

- V_{ki} Velocity of inertial body k relative to inertial body i.
- $d,\ j,\ m,\ g$ Subscripts that denote (Dick, Jane, Mary, God).
- ($x,\ y,\ z,\ t$) Spacetime axes for Jane's frame.
- (x', y', z', t') Spacetime axes for Dick's frame.
- (x'', y'', z'', t'') Spacetime axes for Mary's frame.
- $(x_g, y_g, z_g, t_g$) Spacetime axes for God's frame.

4 The Lorentz Transformation

The *Lorentz Transformation* equations**[5]** pertain to two inertial bodies in empty space. The transformation equations shown below demonstrate how to express the transformation for two specific inertial bodies, in this case Dick and Jane. Although, you can use terminology representing any two inertial bodies, doing so is not always logical. You will learn in **Section 6** why it is not logical to apply the transformation with reciprocity to just any two inertial bodies. I apply the transformation several times in the next section. In each case I use terminology to represent inertial bodies other than Dick and Jane. The reader is expected to mentally follow my substitution of different terminology in place of the terminology shown below which represents Dick and Jane.

$$x' = \gamma_{dj}(x - V_{dj}t) \tag{4.1}$$

$$y' = y \tag{4.2}$$

$$z' = z \tag{4.3}$$

$$t' = \gamma_{dj}(t - xV_{dj}/c^2) \tag{4.4}$$

$$\gamma_{dj} = \frac{1}{\sqrt{1 - V_{dj}^2/c^2}} \tag{4.5}$$

5 The Actual Derivation

The following derivation of the *Absolute Velocity Formula* is based solely on the *Lorentz Transformation*, and consists of the four steps listed below.

- Transform arbitrary event from Jane to God and eliminate unknowns.
- Transform same event from God to Dick and eliminate unknowns.
- Transform same event from God to Mary and eliminate unknowns.
- Solve equations for Jane's velocity relative to God.

The first step listed above is the transformation of an arbitrary event at spacetime coordinates ($x,\ y,\ z,\ t$) in Jane's frame into the corresponding spacetime location (x_g, y_g, z_g, t_g) in God's frame, but I ignore the yz and $y_g z_g$ components in order to reduce mathematical clutter. This also allows me to base all transformations on just two equations 4.1 and 4.4. The transformation shown below is based on those two equations with the terminology changed to represent Jane and God, where Jane's velocity relative to God is V_{jg}. This definition implies that God's velocity relative to Jane is expressed in the identity $V_{jg} = -V_{gj}$. The Lorentz equations with terminology changed is shown in equations (5.1) and (5.2) below. The four unknowns in the two equations are $x_g\, t_g\, \gamma_{gj}\, V_{gj}$.

$$x_g = \gamma_{gj}(x - V_{gj}t) \tag{5.1}$$

$$t_g = \gamma_{gj}(t - xV_{gj}/c^2) \tag{5.2}$$

The above equations are rearranged to isolate the γ_{gj} term as shown below.

$$x_g/(x - V_{gj}t) = \gamma_{gj} \tag{5.3}$$

$$t_g/(t - xV_{gj}/c^2) = \gamma_{gj} \tag{5.4}$$

The above two equations are combined to eliminate the γ_{gj} term as shown below.

$$x_g/(x - V_{gj}t) = t_g/(t - xV_{gj}/c^2) \tag{5.5}$$

The above equation is rearranged as shown below to expose the ratio x_g/t_g in anticipation of eliminating both of those terms.

$$x_g/t_g = (x + V_{jg}t)/(t + xV_{jg}/c^2) \tag{5.6}$$

Note that in the above equation the identity $V_{jg} = -V_{gj}$ was applied. The three unknowns in the equation are $x_g\, t_g\, V_{jg}$. In the next step I perform another transformation of Jane's event, but this time from God to Dick as shown below.

$$x' = \gamma_{dg}(x_g - V_{dg}t_g) \tag{5.7}$$

$$t' = \gamma_{dg}(t_g - x_g V_{dg}/c^2) \tag{5.8}$$

The above equations are rearranged to isolate the γ_{dg} term as shown below.

$$x'/(x_g - V_{dg}t_g) = \gamma_{dg} \tag{5.9}$$

$$t'/(t_g - x_g V_{dg}/c^2) = \gamma_{dg} \tag{5.10}$$

The above two equations are combined to eliminate the γ_{dg} term as shown below.

$$x'/(x_g - V_{dg}t_g) = t'/(t_g - x_g V_{dg}/c^2) \tag{5.11}$$

The above equation is rearranged as shown below to expose the ratio x_g/t_g in anticipation of eliminating both of those terms.

$$x'/(x_g/t_g - V_{dg}) = t'/(1 - x_g/t_g\ V_{dg}/c^2) \tag{5.12}$$

Eliminate unknowns expressed as x_g/t_g in equation (5.12) above by replacing that ratio with the expression for the ratio from equation (5.6).

This results in acquiring unknown terms expressing Jane's velocity relativity to God in exchange for the unknown terms x_g/t_g as shown below.

$$\frac{x'}{\frac{(x+V_{jg}t)}{(t+xV_{jg}/c^2)}-V_{dg}} = \frac{t'}{1-\frac{x+V_{jg}t}{t+xV_{jg}/c^2}V_{dg}/c^2} \tag{5.13}$$

Rearrange equation (5.13) above into a more usable form as shown below.

$$x'[1-\frac{x+V_{jg}t}{t+xV_{jg}/c^2}V_{dg}/c^2] = t'[\frac{x+V_{jg}t}{t+xV_{jg}/c^2}-V_{dg}] \tag{5.14}$$

Note that the only God terms in the above equation are velocity relative to God terms of Dick and Jane. I continue to simplify by eliminating those terms associated with Dick so that the remaining God terms involve only Jane. This is done using the identity $V_{dg} = (V_{jg} + V_{dj})$ as shown below.

$$x'[1-\frac{x+V_{jg}t}{t+xV_{jg}/c^2}(V_{jg}+V_{dj})/c^2] = t'[\frac{x+V_{jg}t}{t+xV_{jg}/c^2}-(V_{jg}+V_{dj})] \tag{5.15}$$

The derivation is already a little messy and we are not even close to being done. I can simplify the above equation some by noting that light propagates at about 1 ft/ns so by accepting those units I can set $c = 1$. Also, I can make the following derivations easier to follow by assigning a red color to the term representing Jane's velocity relative to God. I need to keep track of the red terms because eventually I want to express that term as a function of measurable quantities. Both of these enhancements are shown below.

$$x'[1-\frac{x+V_{jg}t}{t+xV_{jg}}(V_{jg}+V_{dj})] = t'[\frac{x+V_{jg}t}{t+xV_{jg}}-V_{jg}-V_{dj}] \tag{5.16}$$

My goal as I continue the derivation will be to end up with one red term on the left side of an equation, and all black measurable quantities on the right. I begin this section of the derivation by expanding equation (5.16) above beginning with the left side as shown in the partial equations below.

$$x'[1-\frac{(x+V_{jg}t)}{(t+xV_{jg})}(V_{jg}+V_{dj})] =$$

$$x'[1-\frac{(x+V_{jg}t)(V_{jg}+V_{dj})}{(t+xV_{jg})}] =$$

$$x'\frac{(t+xV_{jg}-(x+V_{jg}t)(V_{jg}+V_{dj}))}{(t+xV_{jg})} =$$

$$x'\frac{(t+xV_{jg}-xV_{jg}-{V_{jg}}^2t-xV_{dj}-V_{jg}tV_{dj})}{(t+xV_{jg})} =$$

$$\frac{-x't{V_{jg}}^2-x'tV_{dj}V_{jg}-xx'V_{dj}+x't}{t+xV_{jg}} = \qquad (5.16 \quad left)$$

Next I'll expand the right side of equation (5.16) as shown in partial equations below.

$$= \quad t'[\frac{(x + V_{jg}t)}{(t + xV_{jg})} - V_{jg} - V_{dj}]$$

$$= \quad t'[\frac{((t + xV_{jg})(-V_{jg} - V_{dj}) + x + tV_{jg})}{(t + xV_{jg})}]$$

$$= \quad t'[\frac{(-tV_{jg} - x{V_{jg}}^2 - tV_{dj} - xV_{jg}V_{dj} + x + tV_{jg})}{(t + xV_{jg})}]$$

$$= \quad \frac{-xt'{V_{jg}}^2 - xt'V_{dj}V_{jg} + xt' - tt'V_{dj}}{t + xV_{jg}} \qquad (5.16 \quad right)$$

The left and right denominators cancel when you put both partial equations back together again. The following equation shows (5.16 left) and (5.16 right) combined.

$$\begin{aligned} -x't{V_{jg}}^2 - x'tV_{dj}V_{jg} - xx'V_{dj} + x't \quad &= \\ - xt'{V_{jg}}^2 - xt'V_{dj}V_{jg} + xt' - tt'V_{dj} \end{aligned} \qquad (5.17)$$

Now move the right terms to the left side, and then combine as shown below.

$$\begin{aligned} &(xt' - x't){V_{jg}}^2 + \\ &\quad (xt'V_{dj} - x'tV_{dj})V_{jg} + \\ &\quad\quad (x't - xt' - xx'V_{dj} + tt'V_{dj}) \quad = \quad 0 \end{aligned} \qquad (5.18)$$

The above equation can be solved for V_{jg} using the quadratic formula, but it yields two solutions only one of which is trustworthy. To resolve the ambiguity you need another equation just like the one above. So we either create another event, or we utilize another inertial body. I enlist Mary's help to generate another equation in this final step of the derivation. I won't have to endure another long derivation like that culminating in equation (5.18). I can just look at the end result expressed in that equation and replace Dick's coordinates with Mary's, and replace Dick's velocity relative to Jane with Mary's velocity relative to Jane, as shown below.

$$\begin{aligned} &(xt'' - x''t){V_{jg}}^2 + \\ &\quad (xt''V_{mj} - x''tV_{mj})V_{jg} + \\ &\quad\quad (x''t - xt'' - xx''V_{mj} + tt''V_{mj}) \quad = \quad 0 \end{aligned} \qquad (5.19)$$

With equations (5.18) and (5.19) above you can easily derive a non-ambiguous solution for V_{jg} by modifying the two equations so that the squared term in each equation has the same coefficient, and then simply subtracting one equation from the other.

Equations (5.20) and (5.21) below are identical to the above equations (5.18) and (5.19), except the coefficients have been altered so the squared unknown can be eliminated.

$$\begin{aligned}(xt'' - x''t)(xt' - x't)V_{jg}{}^2 + \\ (xt'' - x''t)(xt'V_{dj} - x'tV_{dj})V_{jg} + \\ (xt'' - x''t)(x't - xt' - xx'V_{dj} + tt'V_{dj}) \quad = \quad 0\end{aligned} \tag{5.20}$$

$$\begin{aligned}(xt' - x't)(xt'' - x''t)V_{jg}{}^2 + \\ (xt' - x't)(xt''V_{mj} - x''tV_{mj})V_{jg} + \\ (xt' - x't)(x''t - xt'' - xx''V_{mj} + tt''V_{mj}) \quad = \quad 0\end{aligned} \tag{5.21}$$

By simply subtracting equation (5.21) from (5.20) we end up with one first order equation with one unknown as shown below.

$$\begin{aligned}(xt'' - x''t)(xt'V_{dj} - x'tV_{dj})V_{jg} + \\ (xt'' - x''t)(x't - xt' - xx'V_{dj} + tt'V_{dj}) - \\ (xt' - x't)(xt''V_{mj} - x''tV_{mj})V_{jg} - \\ (xt' - x't)(x''t - xt'' - xx''V_{mj} + tt''V_{mj}) \quad = 0\end{aligned} \tag{5.22}$$

Finally I solve the above equation for an inertial body's velocity relative to the ***Prime Reference*** of space.

$$V_{jg} = \tag{5.23}$$

$$\frac{(xt' - x't)(x''t - xt'' - xx''V_{mj} + tt''V_{mj}) - (xt'' - x''t)(x't - xt' - xx'V_{dj} + tt'V_{dj})}{(xt'' - x''t)(xt'V_{dj} - x'tV_{dj}) - (xt' - x't)(xt''V_{mj} - x''tV_{mj})}$$

<<< Voilà ! >>>

Absolute Velocity

6 Reciprocity

For more than a hundred years the scientific community has believed that Einstein's theory of relativity must be applied to all inertial bodies with reciprocity. This belief was based in part on Einstein's rhetoric, but mainly on his adoption of Henri Poincaré's *Principle Of Relativity*, which he reworded and renamed declaring it a postulate of his theory of relativity. The postulate mandated that all laws of physics, which includes Einstein's theory of relativity, must be applied to all inertial bodies with reciprocity since inertial bodies **do not have** distinguishable attributes to justify applying physics laws differently to different bodies. But, the *Absolute Velocity Formula* proves that inertial bodies **do have** distinguishable attributes, one of which is their unique velocity relative to space.

This alone invalidates the long held belief in reciprocity, but the invalidation becomes even more apparent when you scrutinize Einstein's theory (the *Lorentz Transformation*) in transforming an event location from Dick's frame to Jane's frame neither of which is at rest in space. But scrutinizing an event transformation requires defining an event. To that end I propose the following definition.

> **EVENT.** An irreversible occurrence with a single spacetime location in every inertial frame.

Now suppose God detonates a firecracker. If we transform the spacetime location of that detonation event from God's frame into Dick and Jane's frames based on Dick and Jane's velocity relative to God, it will specify the spacetime coordinates where Dick and Jane will perceive the detonation in their frames. Now suppose we transform the spacetime location of that same event in Dick's frame to Jane's frame, in accord with the belief in reciprocity. In this case unless Dick's absolute velocity is near zero, the transformed event location will be different from the event location that had been transformed from God's frame to Jane's frame, resulting in two different spacetime locations of the same event in Jane's frame. This violates the definition of an event, but if you ignore the violation simply because every step I described was in accord with today's belief in reciprocity, then you must accept that Jane will experience two firecracker detonations at two different times and locations when only one firecracker was detonated. You would have to be a really good lawyer to justify such an absurdity. Obviously we need to take a fresh look at how to apply Einstein's *Special Theory Of Relativity*. I propose the following constraint in applying his theory.

> **APPLICATION CONSTRAINT.** Einstein's *Special Theory Of Relativity* applies to two inertial bodies one of whom must be God.

If an event in Dick's frame must be transformed into Jane's frame, then since neither Dick nor Jane is God, the *Application Constraint* requires that the transformation be applied twice, first between Dick and God, and then between God and Jane. The two transformations, each based on Dick or Jane's absolute velocity, would in essence comprise a direct transformation from Dick to Jane, and both transformations would be in compliance with the *Application Constraint* since God was involved in both transformations. This constraint is based on the assumption that the alteration of space and time of an inertial body is a function of its absolute velocity. The only way Einstein's theory (the *Lorentz Transformation*) expresses the alteration in this way is if one of the two bodies in the transformation is at rest in space (God) so that the other body's relative motion will be absolute velocity. It is interesting that Lorentz derived his famous equations based on the above assumption.

The *Application Constraint* is simple to state, but not simple to implement. It requires spaceships to measure absolute velocity. But even without spaceships the mathematical proof in this section that absolute velocity is inextricably embedded in the *Lorentz Transformation* should eliminate the misguided belief in reciprocity which has muddied the waters of reality for over a hundred years.

7 Summary

Scientists have debated the issue of absolute velocity for five centuries. All attempts to measure or detect absolute velocity failed. Over a hundred years ago the renowned scientist Henri Poincaré concluded that the centuries of failures were simply due to a law of nature mandating that absolute velocity cannot be measured or detected. Other scientists including Einstein readily accepted his conclusion, and several of them stepped up to the plate and refined the conclusion by appending an obvious consequence involving space. In the early nineteen hundreds a consensus began to form in the scientific community that a law of nature exists mandating that absolute velocity **cannot be measured** and that absolute space **does not exist**. That consensus is stronger today than ever before. But in this paper I revealed the existence of a logic path embedded in the *Lorentz Transformation* proving that absolute velocity **can be measured** and that absolute space **does exist**.

Obviously Poincaré, Einstein and Lorentz, failed to do a thorough autopsy of Lorentz's equations. Actually, for over a hundred years scientists in general have failed to do a thorough autopsy of those equations. If they had they would have discovered the logic path revealed in **Section 5** of this paper. A path culminating in proof that every inertial body in space has a unique velocity relative to the same God, who represents the prime reference of empty space that all inertial motion is related to. The formula proves the existence of absolute velocity which in turn proves the existence of absolute space. It obviously invalidates scientists' long held belief that those entities do not exist. It also invalidates Poincaré's law of nature postulate that Einstein's *Special Principal Of Relativity* was based on. It is somewhat ironic that the famous physicist Max Planck changed the title of Einstein's paper on *Electrodynamics of Moving Bodies*[**9**] to the *Theory Of Special Relativity*[**4**] to emphasize that it was based on that principle. Planck reasoned that since Einstein's theory was strongly influenced by the principle, and since the principle was well received in the scientific community, showing the linkage might enhance the acceptance of Einstein's paper. It did enhance acceptance of the paper, but the flawed principle has mislead scientists for more than a century into thinking that *Einstein's Special Theory Of Relativity* must be applied with reciprocity[**5**] to all inertial bodies.

The *Absolute Velocity Formula* has many important ramifications, but its most delicious ramification is the revelation that it is mathematically impossible to create equations like Einstein used to express relativity (Lorentz's equations) without the same equations expressing the existence of absolute velocity hence absolute space. In other words it is mathematically impossible to have relativity without having absolute space. I was kind of shocked when I discovered that mathematical fact. Who would've ever thought that for over a hundred years that **hidden truth** has been hiding in plain sight in those five simple equations.

Yum!

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