

Refutation Of Einstein's Principle of Relativity

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1.0 Introduction

The special theory of relativity has been shown to be false by many writers since its introduction by Albert Einstein in 1905. Herbert Dingle is the most well known, primarily because he provided the most detailed proofs of the fallacies. Today, it is generally believed that Dingle's arguments have been refuted and that Einstein's relativity theory is not not refuted by Dingle's proofs. In a series of papers available at the GSJ, this writer examined the claim that Dingle's proofs were invalid, but was unable to verify that this claim was correct. Hence, the proofs of the falsity of the special theory of relativity put forward by Dingle stand as valid.

One result of this writer's study of the Dingle controversy has been the development of a new approach to Dingle's refutation. The method used is a mathematically rigorous proof based upon the classical methods of the theory used by Einstein in his papers. The new method is a clarification of minor flaws in Dingle's method that allowed his opponents to refuse his proof that relativity was false on the basis of some false and misleading refutation arguments. The revised version of the argument presented here avoids the minor flaws in Dingle's argument that allowed his opponents to create the impression that his proof was essentially flawed and incorrect.

There are two primary goals in this paper. The first one is show that Dingle's proof was essentially correct and valid, and to point out that the claims put forward by his opponents do not invalidate his proof, but merely indicate minor flaws in the language and method of the proof. That is the flaws were not a fatal error or mistake, but an error in the use of mathematical language and rigor of definitions that allowed his opponents to create the illusion through some erroneous mathematical reasoning that Dingle's argument was in error, while in fact it was not. The second goal is to show that a rigorous proof that the theory of relativity is invalid results when the proof put forward by Dingle is restated in a way that is more mathematically rigorous. In the paper that follows, the restated proof will be presented first and then it will be shown that this more rigorous approach is essentially equivalent to Dingle's method. Finally, the usual arguments put forward by relativists in opposition that the proof is erroneous will be dismissed and shown to be misleading and invalid mathematical arguments.

Finally, in the closing arguments, it will be shown that the relativity theory is conclusively refuted by the argument presented herein, because its conception of time is not consistent with the currently accepted idea of universal physical time (UTC) as used in GPS, and therefore the relativity postulate can not be consistent with the currently accepted methods of time measurement. As a consequence, the relativity postulate is empirically disproved by the fact that a universal simultaneous time system has been constructed using one and only one rest frame.

2.0 Background and Approach

The main source of the arguments regarding the validity of Einstein's theory of relativity are not

scientific but philosophical. This arises because the theory is not strictly scientific in its conception, but is primarily based upon metaphysical presuppositions regarding the nature of time and space. These arguments have involved the philosophy, physics, mathematics, and experimental verification of the theory. In all areas it can be demonstrated that the theory is fallacious. This literature is very extensive and will not be reviewed here. The purpose of this background will be to review the main points of the disagreement. The fundamental proposition of relativity, is that a metaphysical conception of time and space is demanded by a philosophical principle formulated as a scientific law of nature. The theory does this by introducing a postulate of relativity, which has the force of a natural law. Unfortunately this principle of relativity is ambiguous and unclear, and was presented by Einstein in different forms and interpretations.

The main purpose of the approach taken here will be to refute the philosophical viewpoint regarding the philosophical necessity of the principle of relativity by showing that the mathematics used in the relativity theory is not consistent with the relativity principle. That is that what the mathematics of relativity shows, is that one and only one rest frame can be used to obtain a physically consistent mathematical system.

The second proposition, which is also now supposed to be a law of physics, is that the velocity of light is a constant relative to all inertial frames in relative motion. This assertion is also obscure and ambiguous leading to confusion and misunderstanding. The main confusion being that the two postulates seem to say the same thing, or have the same meaning.

Here the method of approach will be to try to clear up this problem by reformulating the postulates in a way that makes the argument logically rigorous. The fundamental idea is as follows. The claim that the velocity of light is a constant is derived from well established empirical evidence that led to the older theory of the aether, wherein the light velocity, c , is physically defined by the physical properties of the aetheric medium and is valid only for the single unique rest frame of the aetheric medium. That is the basis of the light velocity postulate. The essence of the relativity postulate is the claim that there are multiple frames of reference, rather than the one and only one aetheric frame, wherein the velocity of light has the same velocity as it does in the aetheric medium. Hence, to establish the special theory of relativity, it is necessary to establish the validity of the relativity postulate, that there exist more than one reference frames wherein the velocity of light is the constant value of c .

The proof must conform to the following requirement. That the different frames of reference in which the velocity of light is to be measured, must be in relative motion with respect to each other. Finally, as a final point of clarification, the assertion is that the frames which are in relative motion with respect to each other are required to be inertial frames so that the Newton's laws of mechanical or dynamical physics are the same in all of them.

The main point of the disagreements and criticism of relativity can be stated as follows: the claim that there exists multiple inertial frames of reference, in relative motion with respect to each other, wherein the velocity of light has the same numeric velocity value of c is contested, and deemed to be false.

The difficulty posed by this refusal to accept the claim of the relativity postulate is that there is purported to be empirical evidence for its validity in the Michelson-Morely, Kennedy-Thorndyke, and related experiments. From an historical viewpoint, the empirical fact of the null results of these experiments has been taken as proof of the relativity theory. The difficulties in the theory appeared later after acceptance of the theory based upon the apparent experimental evidence. The problem that has evolved with respect to the criticism of relativity has been an unwillingness to accept the rather simple

and obvious demonstrations that the mathematical construction of the theory produces obviously glaring contradictions that indicate that the relativity postulate must be false despite the apparent empirical validation found in the above cited experiments.

To summarize the cause of the controversy. The acceptance of the empirical evidence cited above implies the acceptance of the relativity postulate and the light velocity postulate in the forms stated by Einstein. However, these postulates make no sense in terms of the older electromagnetic theory of Maxwell-Lorentz. The accepted solution to the difficulty has been to modify the current physical conceptions of space and time and to create a new conception of Minkowski space-time, which postulates some illogical ideas regarding the nature of time and space. One of them being the resulting twins paradox with respect to time, and another being the well known paradoxes of space such as the rod and pole paradox. Another difficulty arises in the Lever paradox. The result of this has been to broaden the range of criticism of the theory from those who reject the idea that the Maxwell-Lorentz aether theory is wrong, to those who find the relativistic conceptions of space and time, replete with the attendant absurd paradoxes, completely unacceptable.

Herbert Dingle did not object to the relativity theory on the grounds that it rejected the aether, but on the grounds that its mathematical formulation was inconsistent. This objection developed from the controversy regarding the twins paradox that erupted in the nineteen fifties. Dingle, who had spent many years trying to internally resolve the difficulties attendant to the relativity theory found that he was unable to accept the new orthodoxy regarding the correct interpretation of the twins paradox. That difficulty resulted in his apostasy from the relativity orthodoxy culminating in his proof that the theory has mathematically flawed. Needless to say, his arguments were rejected.

The reason Dingle's objections to special relativity remain important today is as follows. He was the first to point out that there are serious problems in the mathematical formulation of that theory. Prior to Dingle, there had been objections, but Dingle was the first to demonstrate in a forceful way that there is and always has been a serious problem in the mathematical formalism of the theory. Unfortunately, the proponents of the relativity theory were able to use the ambiguity and obscurity of the physical concepts of time as they relate to the theory in terms of its mathematical symbols so as to blunt the force of Dingle's proofs that the theory is fundamentally untenable as a mathematical system. That was an unfortunate result, since the theory does have serious mathematical flaws that do indeed make it untenable as a mathematical system representing a model of physical reality. This thesis will be fully demonstrated in the remainder of this paper.

Before proceeding to the proof itself, the reader should be informed that there has been a lot of controversy over the years regarding the validity of the Lorentz transformation equations. The most relevant recent analysis was presented by Wallace Kantor in a paper published in Physics Essays with the title, Lorentz Transformations Reconsidered, Volume 2, Number 2, 1989, page 152. On page 154, at the beginning of the paragraph following equation (7c), Kantor says: "It follows...that γ^2 must be unity...The symbol v ($\neq 0$), assumed to represent relative uniform rectilinear motion in the fundamental kinematics ...in the *postulated* Lorentz transformations is deduced ($c \neq \infty$) to be zero, representing the contradictory state of relative rest." In the conclusions this point is repeated as follows: "...the symbol v , representing a presumed *nonzero* speed of relative translatory motion, in the Lorentz transformation is paradoxically deduced to be zero....A simple resolution, unwelcome to most physicists, presents itself: The Lorentz transformations are untenable." The significance of this result obtained by Kantor, is that it confirms the analysis and the conclusions developed here. The same result, that the only valid solutions arise for $v=0$, was obtained independent of Kantor, and without a prior knowledge of his results and method.

3.0 PROOF THAT RELATIVITY POSTULATE IS FALSE

This section presents a rigorous proof that the relativity postulate of the relativity theory can not be valid within the mathematical formalism of the theory of relativity. That is to say the following. Given the currently accepted mathematical formalism of the theory as found in the current textbooks, the existing theory of Lorentz transformations formulated within the accepted theory demonstrates that the relativity postulate as formulated by Einstein is a false hypothesis. The proof follows from the standard method of contradiction used in mathematics. That is one assumes a proposition is true and then proceeds to demonstrate that the conclusions drawn from that proposition leads to a contradiction, hence the supposed proposition is deemed to be false. This is a standard method of proof that is universally accepted in all fields of science and applied mathematics.

3.1 Mathematical Approach

This section discusses the mathematical preliminaries that are embodied in the approach to the proof used here. The conception of this proof is based upon a theorem found in elementary algebra textbooks that shows that if a mathematical system, the proof usually is performed for a group, has an identity element or unit, then that element is unique. The proof is usually presented for groups and then extended to more complex systems, such as algebras, through the requirement that the more complex systems are built up from groups. Now the usual mathematical system employed in the theory of relativity, and physics in general, is the real number system and linear algebra. (The system is a linear algebra over the field of real numbers.) Such a mathematical system is assumed to be composed of an Abelian group for addition, which in physics is identified with a coordinate system or frame of reference. It was an axiom of Newtonian physics that coordinate systems were unique. This was embodied in the Galilean transformation, which shifted the zero point, so that the point of zero reference of the moving coordinate system or frame of reference was at rest relative to the moving object.

The important issue of concern with respect to the Galilean transformation of Newtonian physics is that there is employed an equation of transformation that shifts the reference or zero point, relative to an assumed absolute, but undetectable, reference frame. Hence the transformation is merely a change in the reference point or zero point of the system, and after this transformation of coordinates, there remains one and only one zero element for the Abelian group that defines the mathematical system of the reference frame. That is to say the following: that the zero reference point for the calculations in Newtonian physics, which uses a linear algebra over the field of real numbers, is unique. This uniqueness is a required property of the mathematical system being used in the calculations of Newtonian physics.

There is another way to state this requirement. The main point being that once one assumes the existence of a coordinate system for the description of space, or time, then this system of coordinates implies that there exists a unique absolute system of coordinates. This is contrary to the current thinking of mathematical physics, which assumes that there is no such thing as an absolute coordinate system or frame of reference. To answer why this is the case requires an understanding of coordinate transformations. The main concept that is required is the theorem that the automorphisms of a vector space, that is the linear transformations of a vector space onto itself form a group. Now since the identity element of a group is unique, there must exist one and only one unique identity transformation. That is the transformation that defines the unique absolute coordinate reference frame.

The uniqueness of a mathematical transformation law is required in empirical science, because if the

vector that moves the zero point, is not unique, then the resulting transformation produces more than one predicted result. This is forbidden in physics because one requires that physical calculations should reflect the Laws of Nature in which an empirical prediction must be definite and repeatable. If the transformation produces different, not unique, results then no law of physics can be constructed from the theory, since such a law could never be proven empirically.

The reader should note the following. In the mathematics of coordinate systems and their equations of transformation there is the principle that the transformations are bijective, that is that they are one to one and onto, such that the transformation of the coordinates produces one and only one zero point of reference following the transformation. Hence the uniqueness of the identity or zero element of the Abelian group is preserved by the transformation of coordinates.

The mathematical basis of the proof is described by A. G. Kurosh in his book, The Theory Of Groups, Volume One, page 31. He states, "For finite groups the condition (2) in the definition of a group can be weakened to the mere requirement that solutions of the two equations, $ax=b$, $ya=b$ be unique; we can then deduce that solutions of these equations do exist." Here the condition (2) is: "the inverse operation can be performed in G." Now in the definition of a linear algebra, Otto F. G. Schilling in his book, Basic Abstract Algebra, page 96 specifies one of the properties of a vector space, which is a form of linear algebra, as follows: "Property 1: the additive identity(called the zero vector 0) is unique."

3.2 Physical Postulates

It was pointed out in section 2.0 that the ambiguity and confusion regarding the two postulates of relativity requires a more rigorous formulation of them. This restatement will be given here, and the usual order will be reversed from the traditional usage. This is not intended to confuse the reader, but is based upon the belief that the logical order, as presented here, is the best way to understand what is being claimed in the relativity theory, without confusion from the philosophical perspective which requires a reversal of the order of presentation. The philosophical perspective is that the relativity postulate is the primary (first in order of priority), philosophically motivated, starting point; a viewpoint that is contested in this paper. So a different order is proposed.

The method proceeds as follows by beginning with the following assumption, which will be called the first postulate. That is that there exists at least one inertial frame of reference, called the rest or stationary frame with respect to which Newton's laws can be formulated in the usual way and the one way velocity of light is the same in all directions, or is isotropic, and has the numeric value of c . This numerical value of c is assumed to be the standard value given in the SI or International System of units. The usual coordinate system as found in standard relativity textbooks, which follows Einstein's method, will be assumed. Following Einstein, the Lorentz transformation can be derived which gives the transformation of time and space for a moving observer relative to the stationary or rest frame. Hence the assumption of a single rest frame leads to the Lorentz transformation equation as in the aether theory. This transformation can be written for time as $t'=\beta(t-vx/c^2)$ and for space as $x'=\beta(x-vt)$.

The second, or relativity, postulate asserts the following: There exists one or more rest, or in Einstein's terminology-stationary, inertial frames, which are in motion relative to the rest frame postulated in the first postulate (that is the one wherein the light velocity is isotropic) such that the laws of physics, including the numerical value of the light velocity, is the same as in the frame defined in the first postulate. That is there is at least one, or more, inertial frames, in motion relative to the first frame, wherein the velocity of light is isotropic, and has the numerical value c for all directions in which it is measured. These two postulates restate, for the purpose of clarity in the analysis presented here, new

versions of the traditional postulates, which are equivalent to the traditional postulates of relativity. We stipulate that the two postulates are amply proven and are in accord with experimental experience for the case of Newton's laws or the laws of mechanics. We object to the stipulation that the velocity of light is isotropic or numerically the same for any inertial frame in relative motion, with respect to the frame in which the light velocity is proved to have the isotropic constant velocity c . Hence the objection here is the second postulate and it is the purpose of this proof to show that there is no such second, or additional multiple frames of reference, that can be defined within the standard mathematical methods of the special theory of relativity without a contradiction. Since the following proof shows that the introduction of the relativity postulate produces a contradiction, then it must be false.

3.3 Mathematical Development

The hypothesis of relativity is such that it supposes that there exist multiple inertial rest or stationary frames such that the same form applies to the Lorentz transformation equations in inertial frames that are in relative motion. Hence we have the following pair of Lorentz transformation equations: $t' = \beta(t - vx/c^2)$ and $t = \beta(t' - vx'/c^2)$ for time and $x' = \beta(x - vt)$ and $x = \beta(x' - vt')$ for space. The standard method solves the Lorentz transformation equations to obtain the equations $t' = \beta t$, $t = \beta t'$ and $x' = x/\beta$, $x = x'/\beta$.

These are simultaneous solutions because the solutions of the Lorentz transformations that generate them are defined at the moment of time wherein the zero coordinates for both time and space coincide. This is explained in relativity textbooks. Hence it is a principle of the mathematical solutions that they are simultaneous solutions. Furthermore, the symbols for time and space have the same meaning in both pairs of these simultaneous solutions. That is to say, that in the simultaneous equations $t' = \beta t$ and $t = \beta t'$, the symbols t and t' mean the same thing in both equations. Another point regarding the symbols for time and space, is that these symbols represent intervals of time or distances in space. They are not moments in time or points in space. Hence, the symbols t and t' refer to the intervals of time measured on a clock and the symbols x and x' refer to distances measured by a ruler.

The method of solution of two simultaneous equations of the form $y = Ax$ and $x = Ay$ is as follows. There are two cases for solution. In the first case, where it is assumed A is not equal to one, we rewrite the equations as follows: $y = Ax$ and $y = x/A$. These solutions can be represented by two intersecting straight lines drawn on a graph where the x and y are coordinates of orthogonal axes. There exists one and only one solution for this case where the lines intersect at the coordinate point $y = x = 0$ or $(0,0)$. There is however a second solution for the case where $A = 1$. In other words the solution equations are $y = x$ and $x = y$ which result when we substitute the value $A = 1$ into the two equations. In this case, we see that there exists a simultaneous solution for any value of either variable. Hence we see that solutions exist for the case where $A = 1$ but that meaningful solutions do not exist for cases where A is not equal to one.

Before leaving this section, the reader is warned that he must interpret these equations within the context that the symbols used have a simultaneously defined meaning in both frames S and S' and that these symbols represent a transformation of co-ordinates that convert the physical wavefront of a wave generated in S into the same wavefront in S' , and vice versa. Thus the Lorentz transformations are used to transform the physical wavefront in S into the physical wavefront in S' . Since the same physical object is described in S and S' , it is unique, and the uniqueness of this physical fact is the justification for the claim of invariance, that is the mathematical basis of the Lorentz transformations.

3.4 Proof That The Relativity Postulate Is False

The method of proof is as follows. In step one, we construct the system of Lorentz transformations in accordance with the standard method of relativity textbooks. This implies the simultaneous solution of the Lorentz transformations. The symmetry of the Lorentz transformations is invoked based upon the authority of the relativity postulate. Einstein states it this way:

“In general, according to the principle of relativity each correct relation between “primed” (defined with respect to S') and “unprimed” (defined with respect to S) quantities or between quantities of only one of these kinds yields again a correct relation if the unprimed symbols are replaced by the corresponding primed symbols, or vice versa, and if v is replaced by $-v$.”

This quotation defines the role of the relativity postulate in the mathematical theory of relativity and it is this postulate, or principle, that justifies the following equations: $t'=\beta t$, $t=\beta t'$ and $x'=x/\beta$, $x=x'/\beta$. Here we note that the symbol β is the relativistic factor defined as: $\beta=1/(1-v^2/c^2)^{-1/2}$. This factor is equal to the numerical value of one or unity when the relative velocity is equal to zero. That is when β equals 1, the relative velocity is zero or there is no relative motion.

We proceed to the conclusion that there is one and only one solution of the simultaneous equations given above for the case β equal to one. That follows from the discussion of the solutions of equations of the type $y=Ax$ and $x=Ay$ discussed in section 3.2. For the case where β is not equal to one, that is the case where the two frames of reference S and S' are in relative motion, there are no valid solutions, since the solution set exists only for the case where the symbols have the values $t=t'=x=x'=0$. That is a meaningless solution. However, for the other case of solution, we have that solutions exist for the value of $\beta=1$. Hence the equations have simultaneous solutions that exist only when the numerical value of β is equal to unity. This implies that $v=0$ and so the supposed reference frames S and S', that are assumed to be in relative motion, have valid solutions within the theory of relativity only when the relativistic factor is unity, which implies there is no relative motion of the reference frames. Thus, no solution exists for the case when the frames are in relative motion and so the relativity postulate which asserts that such solutions exist for values of v not equal to zero is falsified.

3.5 Comments On The proof Of Section 3.3

The result of the proof that the relativity postulate is false is uncomfortable to physics and it is not surprising that this conclusion has been consistently resisted for the last 100 years. Various approaches have been devised to avoid admitting that the conclusion of the mathematical method is inevitably that the relativity postulate is incompatible with the Lorentz transformation formalism. Here the main points of the proof will be recapped so as to make clear that there is no mistake in the method of proof.

The first step is to make clear the role of the relativity postulate. That is that it is a claim in addition to the light velocity claim that there exists an inertial frame of reference wherein the velocity of light is isotropic, that it is constant, or has the same velocity, in all possible directions. In his papers Einstein derived the Lorentz transformation for the case of the stationary or rest frame. He did not work out the mathematics of the inverse Lorentz transformation, but merely assumed that these transformations existed because he postulated them through the relativity postulate. The discovery of problems came later when using the inverse Lorentz transformation the results produced contradictions or paradoxes.

The purpose of this proof method is to demonstrate that the difficulty arises from the relativity principle or postulate. When applied to the derivation of the inverse Lorentz transformations, the resulting system of simultaneous equations produces solutions which only have validity for the case where there is no relative motion, or the coordinate systems S and S' are stationary with respect to each other.

Solutions do exist when the coordinate systems are in relative motion. This conclusion follows from the simultaneous solutions of two equations of the form $y=Ax$ and $x=Ay$, where the symbols have the same meaning in both equations. The difficulty arises because a pair of simultaneous equations written in this form has no solutions other than the trivial one for values of A not equal to one. This form of the equations arises from the imposition of the relativity principle as stated in the Einstein quotation given above. Hence it is that statement of the formation of the Lorentz transformation pair that leads directly to the mathematical result that the solutions are meaningless. (That is because the result $t=t'=x=x'=0$ is meaningless physically and the result that $\beta=1$ contradicts the hypothesis that the reference frames are in relative motion.) So the conclusion must follow that the imposition of that principle is the source of the difficulties in the mathematical formalism of relativity that leads to the contradictions.

4.0 Comparison With Dingle's Method of Refutation

The purpose of this section is to compare and contrast the method of proof given in section 3.0 with the methods used by Herbert Dingle. The main argument presented by Dingle is that the special theory of relativity was flawed because it contained a contradiction or inconsistency. For example in his controversy with McCrae published in Nature he stated it this way: "Equations 3 and 4 are contradictory: hence the theory requiring them must be false...I regard this as conclusive proof that the special relativity theory is untenable." Here equations 3 and 4 refer to a pair of equations of the same type as discussed in section 3.2. This shows that the fundamental difference in the different methods of refutation hinge upon the form of the following equation pairs: $t'=\beta t$, $t=\beta t'$ and $x'=x/\beta$, $x=x'/\beta$. Dingle's method can be summarized as follows. He derives a pair of equations of the form just stated and argues based on this that the "theory from which they are derived must be invalid."

The proof presented here does not assert that the theory of relativity is invalid, it accepts the theory as valid and mathematically consistent, but that since the theory produces a conclusion that contradicts the principle of relativity, which was assumed to be valid, then that assumption must be false as a result of the rule of contradiction. Hence there is no claim that the theory is wrong, the claim is that when the theory in its currently accepted formalism is properly applied, there is deduced from that correct theory a mathematical solution that contradicts the principle of relativity. Hence that principle is clearly identified as falsified.

4.1 McCrae's Objections To Dingle's Proof

McCrae's first objection to Dingle's proof was the following: "Dingle's assertion is obviously and demonstrably wrong. Using no more than the Lorentz transformation in his algebra, he claims to derive two different values for the same quantity. But the transformation is linear and any result it gives can only be unique. It is trivially impossible for it to give two different answers to the same question. If Dingle obtains two different answers it must be because a) he has made a slip in the algebra, or b) his quantities are not well defined, or c) what he treats as the same quantity are two different quantities."

This statement is a bit obscure as to what it means. The key point is the following: "...Dingle obtains two different answers..." Since that is impossible according to McCrae, then Dingle's argument must be wrong. But it is the fact that the two different answers contradict each other that is the essence of Dingle's proof. Hence by saying that there can not be two different answers, McCrae is denying the existence of any contradiction between the two answers. This objection does not apply to the proof given here because there is no claim that there are two different answers that are contradictory. The claim is that the solution of the equations implies the relativity principle is falsified.

McCrae's second objection is: "About the first thing that relativity theory does is to deny any operational meaning to the notion of simultaneity at two different places. Naturally, this fundamental feature in the theory is not affected in the slightest by any arbitrary conventions we may adopt for the synchronization of clocks. The latter is merely a particular way of putting the readings of two relatively stationary clocks into 1-1 correspondence with each other." This objection arises because in his proof Dingle used a procedure that calculated time intervals based upon events in a nonstandard manner. Actually there was nothing incorrect in Dingle's procedure because he obtained the standard solutions of the equations of relativity in the same form as those derived herein. McCrae's objection is a mere point of confusion designed to sidetrack the argument into a pointless red herring. The method used herein does not permit this objection to arise because the method used is the standard textbook method which derives from Einstein's foundational papers. If this method is wrong, then the theory as currently understood is invalidated.

McCrae's third objection is: "While Dingle's (3) and (4) are meaningless as they stand, the quantities involved can of course be assigned operational meanings in terms of readings of the relatively moving clocks A, B. The formulae do not then tell us about the "rates" of the clocks. They become simply two different ways of putting the readings of A, B into 1-1 correspondence with each other. There are infinitely many different ways of doing this! Being no more than ways of attaching labels, there can be no question of any two these ways being "contradictory." This objection is another example of a red herring or misdirection. Dingle replied that if this were true then the relativity theory is meaningless because the predictions it produces through its mathematical formalism are meaningless if this argument is valid. Dingle's point is this, if the equations of relativity can not be trusted as to the meaning of their predictions in relation to physical quantities then the theory has no useful predictive character as a theory of physics. Despite this relativists try to argue that in the pair of equations $t' = \beta t$, $t = \beta t'$, the symbol for t' in the first equation is not the same physical quantity as the t' in the second equation. If true this would render Einstein's statement regarding the formulation of the relativity principle of his theory given in section 3.2 above a meaningless statement and render the principle invalid by denying its formal principle of application in the theory. So if the symbols don't have the same meaning in both equations of the same pair, then the relativity principle is contradicted by being rendered meaningless. This objection of McCrae's is essentially invalid.

The fourth objection is as follows: "In his 1962 paper, Dingle started from equations (i), (ii) as we have written them (but in his earlier notation) and then derived precisely our equations (iii), (iv). He then asserted, "every symbol has exactly the same meaning in both cases," and he claimed to infer a contradiction. His assertion is false, because here he is not talking about the same thing, but two different things." This statement is repeated here despite the fact that it is a repeat of the previous objection. The purpose is to argue that the claimed contradiction does not arise because the symbols used in the equations which purport to be contradictory don't have the same meaning. But they must have exactly the same meaning in order for the accepted mathematical formalism of the theory to be applied in physics. This follows from the previous argument, that in order for the principle of relativity to be applied as required by Einstein in his theory, the symbols which have the same meaning are exchanged in the pair of equations.

The objections presented by McCrae illustrate the divergence of meaning applied to the symbols used in the Lorentz transformations. Dingle's point was that the equations deduced from the two Lorentz transformations describe different, hence contradictory, physically real states of space and time. McCrae tries to counter that by claiming that the symbols don't represent the same physical state, and so don't produce contradictory meanings. Here the words real physical state mean to imply a unique mathematical solution to equations is possible. (Dingle's implied claim is that no mathematical solution

is possible.) This is the fundamental assumption of relativity. That is there is a solution developed through the symbols in the Lorentz transformations that describes the same points of space and time in terms of different coordinates, and by implication, that a mathematical solution that simultaneously satisfies the two Lorentz transformation equations exists.

The misunderstanding of the role of the Lorentz transformations leads to a major misinterpretation of relativity as is illustrated by McCrae. This is in regard to relativity of simultaneity. Relativity of simultaneity means that the time coordinate of a point in S is not the same as the coordinate of the identical time point in S'. Here the symbols mean that different names (coordinates) are assigned to the same point. Now since the points as specified in the Lorentz transformations define intervals in space and time, the symbols that represent points are also mathematical representations of physical duration and length. The point of Dingle's proof, and the revised one presented here, is that the mathematical representations or descriptions of these physical objects are faulty, and so the postulate that leads to the faulty mathematical representations must be false. The attempt to argue that the mathematical conclusions are invalid by assigning a different physical interpretation to the mathematical representations is invalid. What matters is that the mathematics leads to solutions that refute the truth of the claims made by relativity.

This is the thesis of this section. That Dingle did not make sufficiently clear that fault was in the mathematical procedure and did not relate to the physical interpretation. Dingle's mistake was that in implying a physical meaning, all that was necessary to refute his claim was to deny the truth of his physical interpretation. Which is exactly what McCrea does.

The revised proof given here makes very clear from the defining statement of the principle of relativity that the symbols in the pairs of Lorentz equations have exactly the same meaning in both of them. Hence the last two objections put forward by McCrae are nullified. All that is necessary to complete the proof is to show that the abstract symbols produce no meaningful mathematical solutions relevant to the claims of the special relativity theory.

4.2 Perfecting The Method Of Proof

This writer contends that the method of proof that the relativity principle is false is definitely proved beyond question in section 3.0 of this paper. The main innovations are the following. First, the claim is not that all of the theory of relativity is false, it is that the principle of relativity is false. This approach has the following interesting result. As long as we don't apply the incorrect procedure for the formulation of the inverse Lorentz transformation, the theory remains valid. That is, it is possible to correctly predict the change in the rate of a clock moving relative to a stationary or rest frame using the Lorentz transformation. This fact is in accordance with empirical evidence derived from the Hafele-Keating and Ives-Stillwell experiments, and the Global Positioning System (GPS) implementation. The second benefit of this approach is that the famous paradoxes are eliminated, because they arise from the application of the principle of relativity that gives rise to the incorrect inverse Lorentz transformation.

The basic flaw in Dingle's argument was that he used a *reductio ad absurdum* type argument to produce a contradiction. This type of argument had the disadvantage that it could be countered by a chain of reasoning different from the claimed one, and disputing the conclusion. This is what McCrae did and others since, have followed this same procedure. The procedure here is different in that the result is not a contradiction that invalidates the mathematical formalism, but a result that contradicts an assumption implemented by the mathematical formalism to produce a result. The derived result contradicting the assumption. The difference in the two methods being that in the Dingle approach, the

contradiction invalidates the entire theory and the procedure used to derive the contradiction, while in the method given here the contradiction does not involve a claim that the mathematical system itself is invalid. The difference being that the claim here is not that the mathematics is wrong, but that the physical assumption used to derive the mathematical formalism is false. (Obviously a new corrected mathematical formalism will be needed in a revised theory in order to correct the mistake of the false physical assumption contained in special relativity.)

4.3 The Coordinate Geometry Fallacy Argument

The section addresses the most difficult of the arguments used to refute Dingle's proof of a contradiction. The main reason for discussing it is that it leads to the improved method of proof used by the writer of this paper. The idea was introduced by McCrea and was discussed above in the first paragraph of section 4.1. This objection was repeated and given emphasis by Good with a more rigorous mathematical formulation that gave it the appearance of a profound insight by calling it "A Fallacy In Coordinate Geometry". Its essence is as follows. In his proof Dingle purported to show that the two equations, $t'=\beta t$, $t=\beta t'$ are inconsistent. The coordinate geometry fallacy asserts that the claim that these equations are inconsistent is false because these equations can't possibly be valid mathematical statements. However, by turning this argument on its head, it is obvious that rather than refuting Dingle's conclusion, the coordinate geometry fallacy argument proves him to be correct. In fact it is exactly this argument that leads to the analysis of the solution set for the pair of equations given in section 3.2. The so called fallacy of coordinate geometry as Good named it, really refers to the first case of solution discussed in section 3.2. That is we assume that β is greater than one and arrive at the result that the only solution is the degenerate or meaningless one where $t=t'=x=x'=0$. Since that is a meaningless solution, Good and McCrae see an opening to refute Dingle by saying his equations are meaningless, because the solution is the trivial one and so that means, according to them, that Dingle's claim of a contradiction must be false.

This was basically a trick of language and a tactic of misdirection in meaning of language and is as such a dishonest trick. Dingle's point was that the two equations were meaningless because they contradicted each other so the conclusion was that the theory which produced them, the theory of relativity, was untenable or faulty. McCrae and Good used the same mathematical facts and claimed that this showed that the method of reasoning that produced them, Dingle's refutation argument, was fallacious. So from one chain of reasoning two completely different conclusions were obtained. One that relativity was false and the other that relativity was not false. All that was needed to complete the process of obfuscation was to plant additional confusion and doubt in the mind of the reader. That is the reader was told that Dingle's method of reasoning was not the same as that used by the official theory of relativity, and so his argument had to be fallacious. Clearly only one of the arguments was correct, Dingle's, but that did not seem to be evident in the confusion created by this type of argumentation. In the current method of proof this particular problem is avoided, since the argument does not make the claim that the refutation is based on this particular case of the solution set that creates a contradiction. There is simply no valid solution for the case when β is not equal to one, and the problem is avoided.

Curiously, McCrae and Good failed to notice that their argument regarding "A Fallacy In Coordinate Geometry" had another solution for the case $\beta=1$, which did produce a valid solution, but that in this case the solution implied that the reference frames had no relative velocity. Hence there are no valid solutions for the case of relative motion of the two reference frames, and so there is one and only one frame, the stationary frame, for which solutions exist.

The ironic conclusion is that McCrae and Good were probably technically correct, in a rigorous sense,

by saying that Dingle's claim of an inconsistency or contradiction was incorrect in a very limited mode of meaning, but that conclusion did not save the theory or invalidate Dingle's claim that the relativity theory was fundamentally flawed and incorrect. In other words, Dingle's argument was incomplete, in that to state the existence of an inconsistency was not a complete statement. The complete statement is that only two valid solutions exist, the trivial one, and the case where $\beta=1$, which means that there is no relative motion. The inconsistency argument doesn't disprove the existence of the solution for $\beta=1$, which is a valid solution, but one having no meaning for the theory of relativity, because there is no relative motion allowed by this solution.

6.0 Summary, Comments and Conclusions

6.1 Summary

The main result of this paper is as follows. The principle of relativity, as used in the theory of relativity, which is derived from the statement formulated by Einstein and quoted in paragraph 3.3, has been shown to be falsified. This is not to say that the entire theory and its mathematical formulation is false, that is not necessarily the case. What is the case, is that it is not possible to have two simultaneous rest frames. In other words. We have an “exclusive or” type of logical system. That is the unprimed frame S, can be taken as the stationary or rest frame, or the primed frame S' can be taken as the rest frame, but not both of them at the same time can be rest frames. That is the same as, saying it differently, that it is not true that frame S and frame S' are both stationary or rest frames. A third restatement of the result is that it is only possible for the frames S and S' to both be stationary or rest frames when they are at rest with respect to each other. In which case they are the same frame with a renaming of the coordinates variables.

The point of the use of the “exclusive or” formulation introduced here, is that it explains why the special relativity theory works and appears to be empirically correct, and makes clear why it is false, philosophically. It works when one and only one rest frame is involved in the physics, and it fails when a second rest frame is introduced. So the theory is “half right” in a peculiar use of that concept. That is when experiments are applied using a subset of its mathematical formalism, it appears to produce valid mathematical results. However, the full theory is mathematically incorrect when applied to more than one rest frame.

6.2 Comments

The result derived here should be obvious to physicists. What is strange is that they are persuaded that it is false. They accept the relativity principle because it seems to be a philosophically desirable principle for physics because of its beauty. The difficulty is that this principle leads to some uncomfortable results that violate commonsense notions of physics. Dingle repeatedly pointed out that the theory required that each of two clocks should each run slower than the other, and that this was impossible. Apparently, believers in relativity were prepared to accept that notion, despite that fact that no experiment could ever produce that outcome. They rejected Dingle's claims that relativity was a flawed theory and therefore embraced the notion that two clocks could indeed both run slower than the other one. Needless to say, no such result has ever turned up in an experiment and it is a physical impossibility that this should ever occur. The proof of this statement is contained in the proof presented in Section 4.0. There it is shown that there is no simultaneous solution to pair of equations that could cause two clocks to each run slower than the other.

It is the failure to realize the truth of the statement contained in the “exclusive or” formulation and not

the logical “and” formulation that is the fundamental error in relativity. It leads to the erroneous conclusions that the theory is valid. That occurs when demonstrations are produced that show that frames S and S' are inverses as claimed. This doesn't really require a demonstration, since the statement is true by a definition. That is, once we have demonstrated that a proposition is true for the Lorentz transformation, it is obviously true for the inverse Lorentz transformation, because they are the same transformation with the symbol names changed and the direction of velocity reversed. So stated this method is true for the “exclusive or” case, where either the Lorentz transformation or the inverse Lorentz transformation defines the transformation from the rest, or stationary frame, into the moving frame, but both can not be true at the same time. This last assumption, that is implied by the relativity principle, is the part that is false. It is exactly this last assumption, that the frames S and S' are both simultaneously rest or stationary frames that is false.

It is the confusion over the difference between the “exclusive or” logical assumption and the “and” logical assumption that are both implied in the relativity principle that is the source of the problems in relativity. For instance, the procedure behind the claims that Dingle's arguments are false, is that the equations he derives imply the logical “and” case, and so relativists prove that this case is false, since there are no solutions for this case. As a result, they refute Dingle's argument, but they neglect to inform the reader that it is this logical “and” case that is what the relativity principle really implies.

The problem should have been resolved long ago when it was realized that equation pairs of the form (1) $y=Ax$ and (2) $x=Ay$ that arise in the relativity theory do not satisfy simultaneous solution. That is when we substitute equation 2 into 1 we obtain (3) $y=A^2y$. Which can only be true for $A=1$. Hence the equations can only be a pair of inverses if and only if $A=1$. (This is basically the result obtained by Kantor independently of this analysis.) This fact being ignored, the relativity theorists use solutions for A not equal to one anyway, and these solutions produce results consistent with experiment. That should have been an indication that the theory was false, because solutions for A greater than one are invalid in the relativity theory. Instead they have continued to falsely believe that such experimental confirmations prove the relativity theory. (What they prove is that the theory is “half right” or partly true.)

To make this clear. Equations (1) and (2) are true by themselves. That is either (1) is true or (2) but not both at the same time. Most proofs in relativity work this way. The difficulty arises when it is asserted that both (1) and (2) are true and that produces equation (3) which is true only when $A=1$. Herbert Ives was very critical of the kind of logic discussed above and liked to poke fun at it. Ives would have said it this way: We can believe in the results of our clock measurements just so long as we don't look at the readings on both clocks, but only look at one clock that confirms our theory. Since relativity asserts that both equations must be true at the same time, by the principle of relativity, then that principle must be false as shown here.

6.3 Final Closing Argument

One of Herbert Ives most telling comments on special relativity appears in his paper on the Sagnac Experiment. Ives wrote: “The performer of the experiment is thus left with the alternative of accepting the observed arrival times as a fact, or, if he must cling to a constant velocity of light, of putting his faith in carefully labeled clocks which tell him the signals arrive at the same time. But he must not look at both⁶ clocks at once! In short the physical fact cannot be evaded by juggling the measuring instruments.” In emphasizing this he includes in footnote 6 directly below the statement that “More than one 'time' at one place is a physical absurdity.” This explains why the relativist insists on “looking at only one clock” in an experiment, if he looks at more than one, he will get a different answer for the

time that experimentally refutes his theory. So he is forced to insist upon only one clock as giving the correct and true answer. This explains McCrae's fourth objection to Dingle's refutation of relativity, discussed in section 4.1. McCrae says that Dingle is talking about two different times, that mean two different things, that is they do not represent the readings on two clocks that contradict each other. This must be because in relativity you can never compare two different clocks, because they will produce a contradiction if we do, so we must not compare them.

The advent of the modern GPS system has allowed the definition of a practical universal time (UTC) that is capable of measuring the velocity of light from any place on the earth, without contradiction. In this system there is one, and only one, universal time, and its validity is established for one and only one universal reference frame. Such a system violates the claim of relativity that there are multiple possible rest frames in relative motion that can be used. But as was definitely shown in this paper, the only way that such multiple frames can be made to produce a consistent physical reality, that is consistent clock measurements, is if there is one and only one rest frame, which is exactly the fundamental assumption of the GPS system.

6.4 Conclusions

It is unlikely that the proof of the falsity of the relativity postulate as presented here will result in a scientific paradigm shift rejecting relativity in the near future. Any such development is likely to take a very long time. Relativists are very hardheaded people, and they are slow to embrace modifications to their cherished beliefs. The reader is reminded that they have resisted the truth and maintained their ignorance for over 100 years now, so that is unlikely to suddenly change. However, as Dingle said in his book Science at the Crossroads, the current physics community is using a theory that they do not understand and that presents a danger if they continue to conduct dangerous experiments armed with their current physical ideas, based on the erroneous relativity principle. This may overstate the danger, but an even greater one may be the perpetuation of our physical ignorance because of rigid belief in the erroneous relativity principle.

Oddly enough, there appears to be a sobering aspect of this problem that indicates a major social problem. That is, from a strictly empirical viewpoint, the special relativity theory seems to be a most perfectly successful and accurate theory. This aspect of the problem is probably the most serious and difficult of the obstacles that are to be overcome. In the first place, the idea that a theory is to be maintained sacred and defended as the absolute scientific truth, when it has very obvious and well known defects, just because it fits the experiments facts very well, indicates a very serious problem in the verification of and validation of scientific truth. In the case of relativity, this paper conclusively shows that the principle of relativity as put forth by Einstein is false. So to maintain a scientific theory in the face of obvious proof that it is false, is a rather serious matter for those who cherish the idea that science ought to be about verifying and validating only true scientific theories. Something seems terribly wrong when the scientific establishment holds on to a scientific theory that is demonstrably false once it has been clearly shown to be wrong. In the case of special relativity, the evidence supporting that conclusion has been with us for at least 100 years, and no action to correct the error has been undertaken in that period of time. This seems like a rather obvious case of scientific dishonesty to this writer.

However, there does not appear to be any reason why dishonesty in science should be a surprise as this is a rather prevalent problem in human society in general. The discouraging aspect of this particular episode regarding special relativity, is that our culture teaches that scientific truth is above such petty human failings and that scientific truth can be trusted. This is even more dismaying when we are told

that scientific method is a superior way to find truth as opposed to religion. Today, the masses are told to believe scientists and to trust in them. That is simply not possible when one of the most famous and well known of scientific theories, created by the worlds foremost scientific genius, Albert Einstein, turns out to be a gigantic mistake and ongoing fraud.

Referring back to the difficulty pointed out above, it is a sobering fact that a false theory complies so well with the empirical facts to a high level of accuracy. This definitely deserves the closest scientific examination. Yet, to this writer's dismay, no awareness of this difficulty is evident in the physics community. They seem to erroneously believe that a simple confirming experiment, conducted to a high degree of accuracy, is all that is required to validate scientific truth. The current theory of relativity is an example that refutes that idea, and so it is no surprise that there is no response to that thorny problem. If this gigantic mistake is confessed, the entire edifice of scientific truth is shaken by questions relating to certainty of its empirical methods. In this writer's opinion, this is the more serious of the problems being discussed here. The question as to whether or not the relativity principle is false, or not, is a minor one compared to the problem of whether or not scientists can trust the empirical method of verification as the certain criterion of scientific truth, as they currently do. In the case of relativity, the answer seems to be that empirical verification has demonstrably failed to lead physical science to the correct conclusions. Hence we must ask, why is this the case?

The answer that is proposed here, to these and the other difficulties posed by the principle of relativity, is that there is a fundamental ambiguity in the formulation of the principle of relativity. This ambiguity lies in the failure to state clearly whether the principle implies the "exclusive or" formulation or the "and" formulation of the principle. This lack of rigorous formulation has been the source of most of the bitter controversy and confusion regarding the theory. The relativity camp has generally used the tactic of perpetuating the confusion, since to resolve the problem would reveal that their interpretation of the principle is the logical "and" interpretation that is disproved in this paper. It is acceptance of that result that the proponents of relativity are working to avoid by continuing to perpetuate the confusion.

The inevitable conclusion that is forced upon us, is that the hypothesis that there exist multiple rest frames in relative motion, that is what are called Lorentz frames, for which the laws of physics permit a physically consistent description of reality is entirely false. What the mathematics indicates is that one and only one rest frame, not more than one, or both of them, but only one unique rest frame, permits a mathematically consistent solution.