Knowledge is a deadly friend,
When no one sets the rules,
The fate of all mankind I see,
Is in the hands of fools.

King Crimson

the general science journal

# Herbert Dingle Was Correct! Part VIII

## The Twins Paradox And Dingle's Apostasy From Orthodox Relativity

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### 1.0 Introduction

This paper discusses Dingle's participation in the famous controversy over the twins or clock paradox of special relativity. In his book Science At The Crossroads Dingle informs the reader that: "I mention the controversy here because it was the origin of my realization that the special relativity theory (which, as I have said, at the beginning of that discussion I believed sound) was impossible: it made me see that the theory required that the twins would age both at the same rate and at different rates, which is clearly contradictory." Dingle, however, does not give a more detailed account of his conversion to relativistic heresy.

The objective of this paper will be to fill in this gap, so that we will be able to understand the reasons for Dingle's change in viewpoint regarding the validity of the special theory of relativity. This will be contrasted to the polemical propaganda issued by the relativity establishment, such as the following statement made by James Terrell: "There have perennially been a few physicists who have refused for philosophical reasons to accept this easily derived result (time dilation). Herbert Dingle for one, carried on this controversy for decades until he finally realized that this prediction regarding clocks (or twins) did indeed follow from special relativity, at which point he decided that special relativity itself must be rejected". In later sections, we will see that such statements are merely negative propaganda to be discounted as false.

### 2.0 Objective

The primary objective of this paper will be to show that Dingle's defection from the viewpoint of orthodox relativity was not caused a sudden realization "that this prediction regarding clocks (or twins) did indeed follow from special relativity", but that it was the result of a long process of philosophical alienation from the orthodox beliefs of the relativity establishment. By the mid 1950s, Dingle was no longer able to reconcile the contradictions within the traditional account of special relativity, despite many years of trying to reconcile the differences with a sound philosophy of science.

Here the thesis will be advanced that what Dingle realized as a result of the clock paradox debates of the mid 1950s was that the orthodox teachings of the relativity establishment could not be reconciled with the basic principles of the theory and that attempts to do this were doomed unless a radical reinterpretation of the theory was undertaken. Hence, he concluded that the problem was not within the mathematical theory as much as the way it

was being used, or interpreted, by the relativity establishment. Dingle's apostasy was caused by the realization that this could be changed only by a total rejection of the prevailing establishment interpretation of the theory. Once this idea had taken hold, it was only a small step to see that the best alternative was to return to the theory of Lorentz. However, he never urged the acceptance of a particular substitute theory, and instead focused entirely upon correcting the flaws which vitiated the special theory of relativity.

## 3.0 Historical Background

This section provides an historical background to the controversy of the twins paradox. To understand the controversy, it is necessary for the reader to realize that the controversy is closely related to the historical development of the theory of relativity. So, we will first review the historical periods in the growth and development of the theory. We begin with the first period as the origin of the theory from about 1900 to 1911. This is the period of the formative development of the special theory of relativity and its related predecessor the Larmor-Lorentz theory, later modified by Poincare. The reader should understand that during this period, the difference between these two theories was not sharply defined, as it is today. For most physicists, the two theories were basically the same, having the same mathematical formalism, and producing the same predictions regarding time dilation. As time passed, the Lorentz formalism was superseded by the Einstein formalism, which grew out of Lorentz's theorem of corresponding states and Poincare's principle of relativity, although both theories predicted an asymmetrical time dilation effect.

The second phase, which begins in 1907, marks the transition to the Poincare-Minkowski-Einstein formalism, which became the accepted mathematical formalism for what is known as Einstein's special theory of relativity, although Einstein made only a small, but crucial, contribution to it. It was not until 1907, that Einstein clearly differentiated his mathematical formalism from that of the Lorentz theory. In his 1907 paper, Einstein initiated several important changes to his theory, which have not been fully appreciated. One change was that the asymmetrical nature of time dilation was reduced in importance and a new interpretation of time dilation, as an apparent change in time scale as observed from a relatively moving reference frame was emphasized. This change brought his theory into alignment with the Poincare-Minkowski mathematical formalism which was inconsistent with an asymmetrical time dilation prediction. In his 1910 paper on relativity, Einstein essentially repeated the formalism of his 1907 paper. But, in his 1912 manuscript review of the theory of relativity, which was not published at that time, he returned to the 1905 interpretation which predicted asymmetric time dilation. Thus Einstein's actual position on the correct interpretation of his theory was contradictory and ambiguous. This is an important point to keep in mind as it is the key reason for the controversy over the twins paradox.

In 1908 and in the following years, Hermann Minkowski published a number of papers which were fundamentally similar to Poincare's mathematical theory, and radically altered the mathematical formalism and physical interpretation of Einstein's theory. In addition, Minkowski's interpretation of space and time were philosophically quite radical

in his interpretation of the theory. There were now, four different theories, Lorentz's, Poincare's, Einstein's and Minkowski's, which would eventually merge to become the special theory of relativity, identified with Einstein's name, but in actuality embodied the concepts of many different physicists and mathematicians.

One aspect of the ambiguity of Einstein's different versions of the theory, is that it is not clear how the different versions were transmitted to the physics community. Since the papers were written in German, it is clear that only the German physicists had a direct access to his papers. Other physicists were dependent on translations. This explains why, only the 1905 version of Einstein's theory is widely known. Up until the publication of Einstein's papers in English, his 1907, 1910, 1912 and other papers were generally not widely read or appreciated.

By 1907, Einstein had begun to seek a generalization of the theory of relativity. The first steps in this direction appeared in his 1907 paper. As Einstein moved towards general relativity, other physicists were reinterpreting his special theory of relativity. It is generally agreed that by the First Solvay Conference October-November 1911, that Einstein's theory had become accepted physics. But, this does not tell us which version of the theory that refers to, or just what the physics community believed was the content of the theory. We will see that the acceptance of the theory, did not mean that everyone agreed on what the theory actually implied in terms of physical interpretation. What was apparently accepted, were the Lorentz transform equations and deductions based upon them. Since many physicists thought that this was Lorentz's ether theory, it appears that many thought that Einstein's theory was merely another way to express the Lorentz theory starting from different postulates.

1911 is an important year for our story. It marks the transition from a speculative theory to dogmatic acceptance. In this year, the first relativity textbook appears, in German, written by Max Von Laue. Also in this year, the French physicist Paul Langevin read a paper in which, for the first time, he described what was to eventually become the twins or clock paradox. His reason and motivation for doing this, was to introduce to French philosophers Einstein's new concept of time. Langevin conceived of himself as the missionary of the new relativity physics, spreading the word to the French academic world. As a result of this Henri Bergson was first introduced to the revolutionary new concept of time. Unfortunately, the philosophers were not persuaded to accept the new viewpoint.

At the meeting, Langevin discussed the evolution of the concepts of space and time in physics and presented the principal aspects of special relativity. He suggested that special relativity implies the existence of a stationary ether and stated: "Every change of speed, every acceleration, has an absolute sense". He discussed several examples. One which is the subject of this paper.

Langevin's "The Journey In The Projectile" was an adaptation of Jules Vern's famous story "From The Earth To The Moon". In Langevin's story. One of two twin brothers is

shot by a cannon from the earth while his brother remains behind. When the traveling brother returns, he discovers that he is younger than the brother who remained on the earth. This result being a dramatic illustration of the asymmetric effect of time dilation for the traveller versus his brother. According to Langevin: "Only the traveller has undergone an acceleration that changed the direction of his velocity", acceleration is here "absolute", in the sense that it is the cause of the asymmetry of the aging process.

Also in 1911, Einstein published a paper in which he made a dramatic statement concerning his new time concept. "*If we placed a living organism in a box ... one could arrange that the organism, after any arbitrary lengthy flight, could be returned to its original spot in a scarcely altered condition, while corresponding organisms which had remained in their original positions had already long since given way to new generations. For the moving organism the lengthy time of the journey was a mere instant, provided the motion took place with approximately the speed of light."* Although we do not know whether Einstein or Langevin invented the new dramatic idea of high speed space travel extending the life span of organisms, the idea was clearly being used by proponents of relativity as a new and dramatic illustration of Einstein's concept of time dilation for moving clocks.

In 1908, with Minkowski's introduction of the four dimensional space-time, the formalism and philosophical orientation of the theory was dramatically altered. In truth, Einstein had already been heading in that direction, but it was not until Einstein embraced the new mathematical formalism, within the context of general relativity, that the special theory and the general theory begin to part company. The development of general relativity can be roughly assigned to the period from 1911 until 1919, when the general theory was declared to be experimentally confirmed. It should be recognized that the introduction of the Minkowski space-time formalism, completely changed the theory and its interpretation. The result has been a confusion in the interpretation of special relativity. One result of this was the controversy over the twins paradox.

In 1918, Einstein wrote a paper, in response to intense criticism described later, in which he demonstrated that the asymmetry of the twins aging process could be perfectly explained within the context of general relativity. (Notice that this is what Langevin had said in 1911 based on the concept of an absolute space.) This was necessary because the old special relativity theory, which had been accepted by the physics community prior to 1911, was based on asymmetric aging. But the Minkowski space-time formalism and Einstein's revised conception given in his 1907 and 1910 papers, demanded symmetrical aging. Hence, bringing in general relativity to resolve the contradiction, seemed a good idea. Unfortunately, it became a source of misunderstanding.

There were now a number of theories called the theory of relativity. There was the old Lorentz-Einstein theory dating from 1905, which most people identify as Einstein's special theory of relativity. There was Einstein's special relativity theory of 1907/1910 which was a sort of transition from the Lorentz-Einstein theory to the Einstein-Minkowski version of special relativity. There was the Einstein-Minkowski theory, which

became the foundation of general relativity. Finally, there was general relativity, which was supposed to be a generalization of special relativity, but was largely incomprehensible to all but a few mathematical experts. Thus we see that while the old Lorentz-Einstein theory was understandable to most physicists, the Minkowski-Einstein revision made the theory incomprehensible. This was bound to cause trouble, and it did.

Historians claim that by 1918, the general theory of relativity had achieved "a largely positive reception within the German scientific community". But this was only within the elite mathematical-physical circles. Within the physics community, there was a bitter and acrimonious debate over the validity of the theory, which is generally overlooked in popular histories. The historical descriptions also fail to note the turbulent postwar political turmoil in which Einstein's reputation figured largely as he was identified as an exponent of leftist ideology. Hence it was natural that he would become embroiled in the political strife of the period. It has generally been interpreted that this motivated the opposition to Einstein's theories, combined with anti-Semitism, and other right wing political motives. The truth is probably that this figured in the opposition, but the objections to his theories, which were put forward, have appeared in other time periods and political contexts so it must be conceded that the objections were real and valid and not simply political inventions.

Einstein's official historians say the following: "The theory also met with significant criticism…A few critics of relativity were motivated by extra scientific concerns that led them to wholesale rejection of Einstein's theory. Among the most outspoken of these anti-relativists were the experimental physicists Ernst Gehrcke and Philip Lenard.". Gehrcke is reported to have "called the 'classical theory of relativity' a mixture of mutually contradictory premises and an interesting case of "mass suggestion" in physics." Einstein's defense was that "Accelerated motions are absolute in the theory of relativity".

The first really non-political public debate of relativity (Not tainted by politics of postwar Germany, and not mixed up with accusations of Nazism and anti-Semitism.) occurred following the publication of Henri Bergson's book Duration and Simultaneity in 1921. A review of the modern edition says that: "Duration and Simultaneity deals with one of the great Bergsonian themes, time. A central contention is that science and philosophy alike systematically misrepresent the nature of time. Bergson suggests that the traditional association between the model of space and time is incoherent. Unlike space, time is not measurable by objective standard. This contention is tried out here against the major movement in physics of the day; relativity. Tracing the development of the theory from 'special' to 'general' relativity, Bergson finds that a fundamental requirement of the theory is an impossibility - the assumption that the experiences of two observers moving at different speeds within two different physical systems might be thought of as simultaneous. This is to ignore the limits of possible experience." Although this reviewer's language is prettily academic, one can see that he is saying that Bergson rejected the Minkowski-Einstein conception of relativity.

The significance of Bergson's book is that he subjects the theory of relativity to a critical

philosophical examination and finds that the theory is logically inconsistent. His prime example of this being Langevin's twins story. Bergson clearly points out that the transition from the old Lorentz-Einstein theory to the Minkowski-Einstein theory and general relativity invalidated the conclusion illustrated by the twins story. The twins story being true in the earlier version but the revision to general relativity resulted in a contradiction. Hence, the theory was logically flawed. It is clear that he knew nothing of general relativity in detail and based his views on the Minkowski-Einstein version of special relativity. He also did not know of Einstein's 1918 paper. He was also apparently unaware of the bitter German controversy, and perhaps, since he was Jewish, did not appreciate the bitterness of the response to his criticism of relativity. It was clearly not motivated by anti-Semitism.

Like a lightning rod, he drew severe criticism and the relativity propaganda machine went into overdrive with its polemic against Bergson's criticism. The result was that Bergson's status in academic circles declined. He was beaten into submission. Although his criticism is clear, precise, and justifiably correct, he eventually withdrew from discussing relativity, and refused republication of his book. (The reader should search the internet and discover for himself the continuing unjustified negative propagandistic characterizations of Bergson and his viewpoint.)

The propaganda machine had already been furiously working since the end of the first World War to establish Einstein's relativity theory. A large number of textbooks and popular expositions appeared at the beginning of the 1920s. Although W. Pauli's 1921 book Theory Of Relativity, refers to time dilation as giving "rise to an apparent paradox which was already mentioned in Einstein's first paper and later discussed in more detail by Langevin, Laue, and Lorentz.", it was not until 1921 that the first popular book on relativity, written in English, discussed the twins story as a paradox. This was Arthur Eddington's Space, Time, and Gravitation. The first American book was, The Origin, Nature, and Influence of Relativity written by George David Birkoff, and published in 1925, records lectures given by Birkhoff at the Lowell Institute in 1923. An entire chapter is devoted to "Some Relativistic Paradoxes And Their Explanations". One section titled "An Adventure In Space and Time" gives the twins paradox story basically in the form given it by Langevin. This appears to be the first time that the story is described as a paradox, with an accompanying explanation. This is undoubtedly the result of the relativity establishments propaganda against Bergson's criticism, which was now formulated in the form of a paradox, that was answered before the reader could think of it as an objection to the theory.

In 1931, the American philosopher Arthur O. Lovejoy renewed the controversy in an American Philosophical Journal, The Philosophical Review. Lovejoy's title was "The Paradox of The Time Retarding Journey". This developed into a battle between Lovejoy and Evander Bradley McGilvary, who rejected Lovejoy's criticism of the standard relativistic solution. The controversy demonstrates that philosophical criticism of relativity was the primary resistance to relativity at this time. This criticism was countered by the belief in the superior power of mathematical physics to establish scientific truth.

During the 1930s, Herbert E. Ives developed a theory based on extending the Larmor-Lorentz theory. In 1937 he published an analysis of the clock paradox. He demonstrated that in Einstein's theory "if relative motion only is of significance" the theory predicts that each of the two clocks will be slow with respect to the other clock. He concluded that "Obviously two clocks…cannot each be slow with respect to the other. There is here a logical inconsistency which demands an examination of the premises." This conclusion confirmed the results of Bergson and Lovejoy and anticipated the same conclusion obtained by Dingle, twenty years later. Ives went on to analyze the problem assuming an ether, and concluded that "the behavior of clocks is entirely rational; the clock paradox does not arise…we thus find that the study of moved clocks, using the Bradley-Fresnel ether, together with the FitzGerald-Larmor contractions of length and frequency, indicates an entirely consistent behavior. The 'clock paradox' is a consequence of a sweeping and unqualified application of the hypothesis that relative motion of matter is the only operative factor…that relative motions are alone significant in all cases, is discredited by the physical and logical absurdity of the 'clock paradox'. The use of the ether as the reference frame is supported by its ability to give a rational account of clock behavior." The relativity establishment responded to Ives conclusions by simply ignoring them. Although, they did borrow his experimental proofs, which supported his ether theory, and used them to claim that they proved that Einstein's relativity was correct.

It was not until after the second world war that the twins paradox commanded the attention of the physics community in a controversial way. In 1951, W.H. McCrea published a letter in the journal Nature, which attempted to signal a change in terminology that would not imply that relativity was paradoxical. McCrea wrote "this so-called clock paradox has been well known for many years, and is usually regarded as resolvable by general relativity theory. Nevertheless, it continues to attract attention. (Here he gives three references) so far as I am aware, it has never been made quite clear that there really is no paradox. Though we have only to do with the relative motion , that of M relative to R is not the same as the motion of R relative to M." He then proceeds to give the standard discussion in which he says "It does not matter which observer regards himself as at rest, and neither need know anything about inertial frames. All that is necessary is for an umpire to supply them with standard clocks and scales and to tell each to record a plot of the other's apparent motion. The whole point is that these plots will not be the same. There will be an unambiguous difference between the results which will involve no paradox." McCrea's denial of the relativity of inertial frames, he insisted that the plots will be different contradicting the claim of relativity that all inertial frames are equivalent, was surely a surprise to many readers, and it signaled a reaction, which should really be marked as the beginning of the acrimonious debates over the twins paradox during the 1950s.

McCrea's comment immediately provoked Herbert E. Ives to rebut his assertions. Ives ridicules his claim that there is no paradox by commenting, "It exists only for observers who have been asleep during the changes of direction of motion of the clocks." Ives then gives a mathematical discussion and concludes that there is no asymmetrical aging, since

"Both observers conclude that it is the other's clock that has slowed down." Hence the aging is symmetrical and both twins age at the same rate. Ives apparently assumed that McCrea's claim of an asymmetrical history plot for the different observers, was a ridiculous joke deserving of ridicule. Ives humorous style mitigated the serious aspect of his rebuttal, which was ignored. It is clear that this exchange of views was only a preamble to a rising interest in the problem.

In a 1955 book, The Foreseeable Future, Sir George Thomson included McCrea's claim of an asymmetrical aging effect in his discussion of space travel. This provoked Herbert Dingle to respond, and the battle was joined over the twins paradox debate. The result was a tremendous surge in interest in the problem, as different views, pro and con, were published by experts and "lesser lights" on the subject.

In 1971, L. Marder published an attempted "review of the literature on the clock paradox of relativity." He makes the comment that there is a wealth of material, but he only covers the period from about 1955 to 1970 in detail. Effectively ignoring most of the literature prior to the mid 1950s. During the period surveyed by Marder, there was a tremendous surge in published scientific papers on this subject. Marder cites 305 reference sources, almost all of which were published after the beginning of the debate circa 1955. This debate seems to have been provoked by Herbert Dingle's public rejection of the standard explanation of the twins paradox, and his dogged rejection of attempts to silence him.

Our primary interest here is Dingle's apostasy from relativistic orthodoxy. This began, as Dingle says when "In 1955 I adverted to this problem as a result of reading Sir George Thomson's book, *The Foreseeable Future,* in which it was stated that, according to the most authoritative view, the former result was correct and the latter therefore incorrect. In an article in *Nature* I claimed that the twins must necessarily age at the same rate because it was an essential requirement of the special theory of relativity, which I then believed to be sound, that no observation was possible that would enable one to ascribe the motion preferentially to either twin." Here Dingle's reference to the former result means asymmetric aging, the standard interpretation, which he then opposed. The reader should note that this was a reopening of the same controversy that had been provoked by Einstein's critics during the teens and then later by Bergson, and Lovejoy.

In 1956, Dingle published a paper which presented his analysis of why he rejected the solution of the twins paradox given by McCrea. This was answered by McCrea in a very brief note, which made the astonishing statement that "The correct solution was published…by Ives (1951)", apparently forgetting that Ives had refuted his own solution and had concluded there was no asymmetrical aging, as Dingle had been asserting all along. McCrea then goes on to claim that Dingle's criticisms were "based upon mis-readings" of his arguments. This signaled that the debate had become more about the perception of being right, than the search for scientific truth.

In 1957, E.G. Cullwick published a book with the title Electromagnetism And Relativity. This book presented an analysis of the twins paradox problem, which attributed the

incorrect conclusion of the traditional solution, as presented by McCrea, as due to a misunderstanding in thinking "that different *units* of space and time must be used in the two reference systems, S and S'." Cullwick says that "Einstein's theory of relativity…is quite different." The appearance of this book can be taken as marking a shift in Dingle's viewpoint from acceptance of that theory to rejection of it. It is certain that Dingle read Cullwick's book, but it is much less certain what influence it may have had on his views regarding the validity of relativity. It is clear that following the appearance of this book, Dingle began publishing claims that the theory of relativity was faulty and attempted to explain why this was the case.

Dingle continued to assert that the theory was faulty from 1957 up until his death. During the 1960s, his arguments, published in Nature, provoked lively debate, but they were unable to shake the establishment belief in the correctness of relativity. Eventually, the editor refused to publish Dingle's claims, having closed the debate as decided in favor of McCrea's viewpoint. In 1971, L. Marder published his review of the clock paradox debate in the book Time And The Space-Traveller. It presented the definite conclusion that Dingle had been wrong, and that asymmetrical aging was a proven scientific fact. Dingle, however, continued with his claims that relativity was false by publishing his views in other publications that would accept them, such as The Listener. In 1972 he published his landmark book Science At the Crossroads, which summed up his arguments and the reaction of the scientific community in suppressing his viewpoint. He continued the crusade up until his death on September 4, 1978. His final paper appeared posthumously in Wireless World, October 1980, thanks to the work of Ian McCausland in getting it into print.

Due to the efforts of McCausland, Dingle's work has remained as a topic of discussion, although the physics establishment views the question as definitely settled against his viewpoint. A number of papers have appeared over the years since Dingle's death, which attempt to show that his claims were erroneous. The main example of this was the series of papers by I.J. Good. In these papers, Good attempts to refute Dingle in a rather curious manner. He attributes to Dingle the concept of asymmetrical clock dilation which he then proceeds to demonstrate is erroneous and contradictory to the mathematical formalism of relativity. This is particularly ironic, for the following reason. It is the traditional relativists such as McCrea who advocated that asymmetrical time dilation was a valid prediction of relativity, not Dingle. Dingle used that hypothesis to demonstrate that it resulted in a contradiction, hence demonstrating that the theory was inconsistent. But Good asserted that this approach was not in accordance with the mathematical formalism of relativity. The irony here is that it was McCrea and the traditional relativists who made this claim and not Dingle. So that Good's refutation is either totally erroneous or dishonest in attributing an error to Dingle which rightly should have been recognized as a misinterpretation due to Einstein and his followers. Hence, the confusion and misinterpretation continue up to present day.

**4.0 Einstein's Ambiguous Physical Interpretation**

It is important for the reader to understand that the twins paradox controversies in relativity do not arise from inventions of opponents of that theory, but arise from the contradictory statements made by Einstein. Here the blame is to be placed clearly on Einstein's lack of precision in developing a correct physical interpretation for the mathematical formalism of his theory. This is, of course, complicated by the fact that the mathematical formalism, which the theory uses, was developed by Poincare and Minkowski and not Einstein, who really only contributed a physical interpretation, which was ambiguous.

In the 1905 paper, Einstein makes pronouncements that lead to the logical conclusion that his theory is contradictory. Take for example his section 2, On The Relativity of Lengths and Times. He gives a definition of length which is clearly a contradiction. He defines the length of a moving rod in two different ways and tells us that they are different. One is the length of the moving rod, measured by an observer moving with the rod, and the other is a length as seen by a stationary observer. By calling both of these a length, Einstein is making a grievous error, because the concept of length is a physical conception that is by necessity not subject to the opinion of different observers.

There is of necessity the following requirement-in order for the concept of length to have a physical meaning- that the meaning be observer independent. This being a primary requirement of measurement, because without it, different observers can not attach any objective, observer independent, meaning to the concept of length. But Einstein abuses this principle and proceeds to define two different lengths. Hence, in principle, the concept of measurement of a physical quantity in physics becomes meaningless since no objective numerical measure can be assigned to a length if there are multiple numbers mapped into this physical conception. Hence the physical concept of length lacks the mathematical property of having a unique number assigned to it.

Obviously the reader is left with his own conception of what Einstein's length means. Thereby making it a function of the readers interpretational opinion. This opinion is obviously not going to be a unique one consistent with what Einstein intended. It can be different from or the same as what Einstein intended, and the reader's interpretation can not be a misinterpretation because what Einstein specified was not a uniquely defined conception.

Once the reader has decided that he understands what length means, he then is faced with the dilemma of determining if this is consistent with what Einstein says in section 4 of the same paper. There the conclusions which Einstein draws have two different physical interpretations which are consistent with the physical concept of a measure of length. (1) The length of the moving rigid sphere observed in the stationary frame was contracted by the relative motion. (This would be what Lorentz claimed and became known as the Lorentz-FitzGerald contraction.) (2) The length of the moving rigid sphere was unaffected by the motion but that the true measure in the moving frame appeared to be contracted when measured from the stationary frame because of the relativity of simultaneity.

While this second interpretation seems to be what Einstein intended, the reader should ponder the fact that this is not what relativity books say. For example W. Pauli in his The Theory Of Relativity says that "the (moving) rod is contracted…the same formula applies to the contraction of its volume". The use of the word contracted implies a physical change in the moving rod.

Once the reader has digested the difficulties in understanding the length problem he faces the more daunting task of time measurement. There are again two possible conclusions. (1) Asymmetrical Aging Case-The clock in the moving frame is caused to run slow relative to the stationary clock as a result of its motion. (2) Symmetrical Aging Case-The time seen by the stationary observer on the dial of the moving clock from his position in the stationary frame is slow compared with the reading on his reference clock. While it seems that Einstein may have intended to mean the second interpretation, his statements in other places contradict this interpretation. For example in the paper of 1905 he gives two examples which agree with the first physical interpretation--the concept of asymmetrical aging. Hence no unique physical interpretation can be given to Einstein's interpretation of time. Relativity books also give statements contradictory to the second - symmetrical aging-interpretation. For example Pauli says that "the time scale is changed by the motion".

The point of the preceding was to discuss some of the reasons why there arose conflicting interpretations at variance with a strict relativistic interpretation of Einstein's theory. The problem of length contraction is a good example. Some readers saw Einstein's theory as specifically predicting a physical length contraction in the moving frame, just as Lorentz had done in his papers. There is a certain consistency of thought in this view, which rejected the idea of a physical contraction of a rigid rod due to motion through the ether, but accepted the same concept as arising from a physical contraction of space itself. In both, the same result was viewed as capable of explaining the null result of the Michelson-Morley experiment. A physical change in the length of the apparatus.

The above interpretation was entirely consistent with the statement made by Einstein in his response to a claim by Vladimir Varicak in a dispute with Paul Ehrenfest. Varicak thought that the supposed contraction effect was merely apparent, and not physically real. Einstein rebutted this view in the following statement. "The author unjustifiably perceived a difference between Lorentz's conception and mine with *regard to the physical facts.* The question of whether the Lorentz contraction does or does not exist *in reality* is misleading. It does exist "in reality' inasmuch as it does not exist for a moving observer; but it does exist "in reality', i.e., in such a way that, in principle, it could be detected by physical means, for a nonmoving observer." It is certainly clear from this that Einstein has embraced the concept that physical reality is observer dependent and that there is no reality that is objectively observer independent. This is the crux of the relativity problem, but this fact was not recognized and fully faced as a philosophical issue. It is at the root of Dingle's apostasy.

The reader should notice that in Einstein's above interpretation, it is possible for there to be as many different physical lengths as there are observers with different relative velocities, since each of these observers will obtain a different measure of length. This is essentially the problem with Einstein's theory. This problem creates even more difficulties when the problem of time is addressed.

The above clarification appeared in 1911, the same year as Langevin's twins story appeared. In view of the above, it is not a surprise to discover that Langevin's interpretation is an equivalent one for time. But in this case, the problem arose that for every different observer, there should be a different age for the traveling twin. However, this problem never appeared in practice, because in the story of the traveling twin there is only one other observer, the other brother. Relative to the stay-at-home brother, the traveling twin has one unique age upon his return, because there is only one rest frame in this story.

The reader should notice an important point. The paradox arises because the concept of a biological age is an observer independent idea, but when used in the twins story this absurdity does not seem to arise in the traditional approach. The traveling twin sees no change in time, from his point of view he is aging normally. The paradox or contradiction arises because when he returns home it is his twin brother who has aged significantly. But this implies that his stay-at-home brother's biological clock has run fast relative to his own. This is not in accordance with relativity, which predicts that the two twin brothers should both be younger than the other, because the other clock should be running slow. Hence something is obviously wrong. But the traditional interpretation avoids this view of the story and stresses that the traveling twin returns younger than his stay-at-home brother, which is a result of the fact that the time as represented by the biological age for the traveling twin was dilated or slowed down. The ironic result is that Einstein's observer independent physical interpretation created a contradiction, which the theory denied by returning to an absolutist interpretation. In this interpretation, it was only the traveling twin who was in real motion, hence it was only his clock that ran slow. But this contradicted the principle of relativity which was pushed into the background. The theory of relativity, denied relativity and became an absolute theory. But this fact was obscured.

There is a simple explanation for this. Einstein's main purpose was to prove that time was dilated by motion. The problem was that he thought that Poincare's relativity could be used as a mathematical formalism to make this idea a physically meaningful concept in opposition to Lorentz's ether based theory. This idea was wrong, because Lorentz's theory provides a better mathematical formalism than the Poincare relativity theory. But unfortunately by 1911, Einstein was committed to a false mathematical formalism. The fact that it gave predictions contrary to his physical interpretation turned out to be an unfortunate but surmountable obstacle.

**5.0 Dingle's Views Regarding The Twins Paradox**

When Dingle began to look into the twins paradox, he, like Bergson, Lovejoy, and Ives

before him, became aware of the inconsistent predictions of the special relativity theory. But the immediate concern or puzzle of interest was the asymmetric versus symmetric aging of the twins. This is the essence of the paradox for Dingle and other critics, while for relativists, the paradox was contained in the asymmetric aging of the twins. It is important to understand that from the relativist viewpoint, the denial of asymmetric aging was perceived incorrectly as a denial of time dilation. Hence, their emphasis was on the experimental proof that time dilation was a proven prediction of the theory. The critics or doubters, as Marder calls them, were not concerned with disproving time dilation, but with the problem of understanding why the prediction of asymmetrical aging was demanded by the theory when it contradicted the postulate of relativity which obviously demanded symmetrical aging.

To see the dissonance between perceptions, we can compare Dingle's statements with Marder's interpretation. For Marder, who takes a traditional relativistic interpretation, Dingle's claims are false because he rejects time dilation. The reader of Marder's book soon discovers that Marder's subject is not the twins paradox, he considers that above disproof, but the refusal to accept relativistic time dilation. Since this can only be distinguished by asymmetrical aging of the twins, that result must be defended at all costs. The reason for this is clearly that the asymmetrical aging prediction is the only one that can actually be proven experimentally. Hence, effectively the asymmetric aging example as given by the story of the twins, is the essence or pinnacle of special relativity, its *ne plus ultra.*

Dingle on the other hand never disputed time dilation. As he tells us "It might help to avoid further digressions if I say that I freely assent to the so-called 'relativistic contraction of time'; I have never thought of questioning it. What I deny is the asymmetry. If Einstein's theory is right---and I do not doubt it---the 'traveller will come back younger than he expected to, but all that his twin (if he is not a relativist) will dispute is the travellers tale that he has been so far as he says: their best friend will still not know them apart." This appears in Nature April 27, 1957, so we can definitely state that his apostasy was after this date.

Dingle concluded his argument with the following challenge. "It should be obvious that if there is an absolute effect which is a function of velocity only, then the velocity must be absolute. No manipulation of formula or devising ingenious experiments can alter that simple fact." Here he lays down what is necessary to formulate an answer to the problem. It is not sufficient to show that asymmetrical aging of a space traveling twin is predicted by the old Lorentz-Einstein theory of 1905, but it is a necessary condition that it be demonstrated that asymmetrical aging is also a valid prediction of the Einstein-Minkowski theory which forms the basis of general relativity. Here we arrive at the crucial issue. For relativists, the differential dynamical condition of the space traveling twin is sufficient to demonstrate this. However, Dingle demanded a real proof, and this was never produced.

Here the issue is: What constitutes proof? For Dingle, the proof required more that a

simple statement of asymmetry of acceleration, in order to justify symmetry breaking. But for relativists, this was demanded by the fact that asymmetrical aging was the result of time dilation, and that effect was the hallmark of relativity, and therefore had to appear as a result of the theory. It never occurred to them that the radical transformation of the mathematical formalism between 1908 and 1916 negated the most famous result of the 1905 theory. The perceptive dissonance of relativists in failing to understand this point had been the issue since Bergson's publication of Simultaneity and Duration.

But relativists were used to having their way. The entire scientific establishment was backing them. Hence, the following statements were inevitable: "the accepted theory of relativity …quite definitely implies that a space traveller will return from his journey younger than his stay-at-home twin brother." Here the key word is accepted. Use of this word makes the statement true, but it does not make it true that it is a valid deduction from the Minkowski-Einstein theory of relativity. "Thus we see that the conceptual problem underlying the controversy is the same as that involved in any of the standard apparent paradoxes concerning the apparent simultaneity of separated events in different inertial frames" This second statement by J.H. Fremlin in Nature September 7, 1957, only makes the obscure, even more obscure. It is not a proof, but merely a statement of belief about something, relatively vague and unclear. (The problem with Fremlin's statement is that it doesn't tell us why different frames have different physical results.) The problem here is this. Relativity, being the accepted theory, is assumed to be correct, hence, relativists don't feel compelled to produce any proof of their statements.

During the controversy it escaped the notice of the traditional relativists that they were advocating the first interpretation of time dilation as discussed above, and that this was definitely in contradiction with the principle of relativity, but consistent with Lorentz's ether theory and the idea of absolute time.

**5.0 Experimental Proof Claimed As Validation Of Asymmetrical Aging**

Many physicists are erroneously persuaded by arguments that the theory of relativity is experimentally proven, and is therefore beyond question. This type of reasoning has one very serious and fatal flaw. The experiments are never actually compared to the actual procedure specified by the synchronization criteria of special relativity. Clocks are used in only one experiment and they are not synchronized in that one.

This is certainly a puzzle that deserves attention. If the theory of relativity is to be experimentally verified, then should not the clocks used be synchronized in accordance with the prescription given by the theory? That prescription requires that the clocks are synchronized according to a definition given by Einstein. However, no experiments are performed according to the protocol specified by the theory, they are all based upon unsynchronized clock proxies, and only the Haefle-Keating experiment actually uses clocks. Furthermore, no experiment has ever been done to test the crucial symmetry requirement, and because of this there is no way that it can be clearly stated that the experiments confirm relativity, while at the same time disproving the alternative theory of

Larmor, Lorentz, and Ives which assumes an absolute space or ether.

There are two ways that can be employed to escape this problem. Claim that the synchronization protocol is not really an essential part of the theory, and by ignoring it. Defenders have selected the second approach. But, that is basically a dishonest avoidance of the problem. If the relativity of simultaneity is really an important aspect of the theory, then it should be tested as part of the experimental protocol and not ignored or neglected as has previously been the case.

The reason is as follows. Relativists claim that the relativity of simultaneity is the cause of time dilation. The explanation is however vague, and it is certainly wrong. This claim makes it even more imperative to perform the crucial experiments, with clocks synchronized as specified by the theory. Then it can be tested in a manner that actually conforms to the theoretical requirements. But since it is clear that this verification is technologically impossible, it is also clear that the theory is actually unverifiable in principle. This is a severe problem that should force us to reevaluate the theory and the imposed belief in its truth. Hence, because the theory can not be verified using the specified synchronization procedure because it is impossible to perform, then this entire aspect of the theory should be rejected and redacted from the textbooks.

As noted above, the traditional relativists failed to notice that their support for the claim of asymmetrical aging was in violation of the principle of relativity. However, in their minds the theory of relativity definitely predicted asymmetrical aging (case one above), and since this prediction was verified by the experiments, then it was obvious that relativity was validated, and therefore any objections raised by Dingle were therefore invalid on experimental grounds. This resulted in the peculiar result that experiments which contradicted the principle of relativity were taken as proof of the validity of the theory of relativity. All of this being a consequence of Einstein's lack of precision in clearly defining the correct physical interpretation as given by the second case discussed above.

**6.0 Dingle's Apostasy Not a Sudden Development**

Dingle's statement that the twins paradox forced him to reevaluate the logical consistency of relativity can not be questioned, however, it does not give us the entire story. When we examine Dingle's publications during the period before the 1950s, we discover that his scientific philosophy was already at odds with the prevailing logical positivism of the physics establishment.

Dingle's first attack on the relativity establishment was delivered in a 1937 Nature article titled "Modern Aristoteleanism". This article was not a polite academic criticism, but a direct frontal assault upon the prevailing dominance of metaphysics in scientific thought, which Dingle says "came by metaphysics out of mathematics". He calls it an idolatry "of which 'The Universe' is the God...its various forms have this in common, that they transcend observation and cannot be derived by induction from observation alone.

Furthermore having, been created, they dominate experience instead of representing it...What is more surprising is that the world of science is generally accepting it with at best a silent protest, kept inarticulate by a lurking fear that what cannot be understood might haply be true." What is the cause of this sea change in scientific method and belief that has brought metaphysics to a dominate position in science at the expense of The Art of Experiment? Dingle tells us that "The theory of relativity appears to be the innocent cause....This was a mistake." Unfortunately, the rest of Dingle's insightful paper is outside the scope of this discussion.

In his 1939 paper, Dingle continues his argument that relativity is metaphysical and not based on sound principles of experimental method. Dingle makes a very tentative and crude start at redressing this fault, by trying to outline some of the necessary principles in his discussion debunking the new "metaphysics of time", which he saw as embodied in the recently reported results of the now famous Kennedy-Thorndike experiment. Dingle vainly endeavors to remind the scientific community that time is an observational phenomenon, and that it is conventionally defined by measurement relative to a prescribed standard of time. Dingle defines it this way. "A clock is any mechanism which successively records time intervals certified as equal by comparison with the standard intervals adopted at Greenwich and other observatories."

In 1942 Dingle was severely criticized by Paul Epstein for not giving Einstein's "operational method" in his book The Special Theory Of Relativity. (See my paper http://www.wbabin.net/science/ricker21.pdf for more on this.) Epstein's attack was clearly motivated by what he perceived as a serious omission in Dingle's approach to the theory of relativity, which neglected to emphasize the logical positivist philosophical approach to physics.

In October of 1955, while in the midst of the debates over the twins paradox, Dingle published in the journal Mind, V.64, No. 256, pages 433-454, a paper with the daunting title "Solipsism and Related Matters". It is a philosophical argument, but one wonders why this topic, solipsism, which Dingle calls a menace, should be a subject of concern to a physical scientist. This author's answer is that solipsism taken as a philosophical viewpoint was viewed by Dingle as a serious problem in the philosophy of science. Dingle makes the connection clear, when he says "But the interest of the logical positivists is concentrated in meaning rather than existence, and since they claim that the meaning of a proposition lies in the means by which it can be verified (or falsified), it becomes difficult for them to assert that "you" exist in the sense in which "I" exist unless the evidence for "you" is identical in character with the evidence for "I". That it most certainly is not." Now to refresh the memory of the reader, logical positivism is the scientific philosophy attributed to Einstein, and Dingle's critique of this viewpoint is an attack on the scientific philosophy upon which the theory of relativity is based.

A through discussion of Dingle's argument is beyond the scope of this paper. The main point here is the claim that Dingle's disagreement with relativity goes beyond the specific claims of that theory towards its underlying philosophical position. That position is

illustrated by the statement made by Einstein in his rebuttal to Vadimir Varicak given in section 4.0. For Dingle that philosophical position is a form of solipsism. This author has called it an observer dependent philosophy of "reality". Dingle clearly objects to this view and prefers the more traditional view of science as establishing a more objective observer independent view of scientific "reality". Dingle's paper was clearly a reasoned argument against the prevailing acceptance of logical positivism as a philosophy of science.

The years of controversy over the twins paradox had the beneficial effect for Dingle that he was able to carefully reduce his arguments to their crucial essence in a succinct manner. This was eventually summarized in his 1972 book Science At The Crossroads. There the essential issue was reduced to the following problem. The theory of relativity predicts that given two relatively moving clocks A and B, the moving clock A runs slow relative to the rest clock B. But, as Dingle pointed out, we can reverse the roles of the clocks so that now the opposite result occurs, B runs slow relative to A. Since both clocks can not both run slow relative to each other, the basis of the theory must be false. This contradiction remains the fundamental basis for the refutation of relativity. Since there is no proof that it is fallacious, the theory is disproved. In the following sections, we will examine the considerations that led Dingle to this conclusion.

**7.0 Asymmetrical Aging Implies An Absolute Rest Frame**

An apparently unintended consequence of the asymmetrical aging result embraced by the twins story, is that it leads to the conclusion that there must be an absolute rest frame, relative to which the asymmetrical aging result can be determined. This was apparently overlooked by Einstein when he embraced the principle of relativity in both of its forms.

There are actually two different versions of the principle as given by Einstein in his 1905 paper. The first states there is in physics no concept or property corresponding to absolute rest. The second states that the laws of physics have the same form for all reference frames in relative motion. Einstein erroneously believed that these two statements were equivalent, however, it is clear that the twins paradox refutes this conception. There are two different mathematical formalisms for the two versions of the principle of relativity. The first version implies the familiar Poincare-Minkowski space-time formalism taught in relativity textbooks. The second principle, as demonstrated by Lorentz, leads to an absolute space and time theory which models an embodiment of the luminiferous ether. The mathematical formalism of this theory is not well known. But both involve groups of Lorentz transformations.

The difference is that the Lorentz transformations of the Poincare-Minkowski space-time form an Abellian group. They are reciprocal, a misleading word unless carefully defined, with respect to opposite rotations in a four dimensional space-time. This is equivalent to the additive group of numbers, since the rotations are forward, positive, and backward, or negative. The Lorentz transformations can also form another kind of group which is reciprocal, in the sense of an inverse number. This is a multiplicatively reciprocal group. In this group, the inverse is the reciprocal number, or the multiplicative inverse. The

difference is that the Poincare-Minkowski formalism is equivalent to a projective geometry in Euclidean space, while the second formalism is actually consistent with the common idea of measurement of a physical quantity. It turns out that it is not possible to attach any observer independent physical interpretation to the Poincare-Minkowski formalism without contradiction. However, the second formalism does lead to an observer independent physical interpretation without contradiction. (This has been demonstrated by the author in many of his papers.)

When we examine Lorentz's electromagnetic theory, which assumes the existence of an absolute ether frame, we see that his principle of corresponding states is equivalent to the Poincare-Einstein principle of relativity, which asserts that the laws of physics remain unchanged in all relatively moving inertial reference frames. This point has not been appreciated by physicists, who apparently believe that he principle of relativity in the second form is unique to the Poincare-Minkowski mathematical formalism of the special theory of relativity. This is a false conception, because Lorentz developed his theory using the same principle, but in a different role. In Lorentz's theory, the principle of relativity, he calls it the theorem of corresponding states, came about as a theorem or result of the Lorentz transformations, while in Einstein's theory, the principle was assumed as a postulate, which was then used to derive the Lorentz transformations. However as discussed previously, the mathematical structure of the two theories is not the same. This dissimilarity of mathematical structure is the root cause of all the problems in the special theory.

Dingle, along with critics before him, saw clearly that the asymmetric aging assertion implied an absolute observer independent physical change in the rate of a moving clock, which was unique to that clock and implied that there was a fundamental difference in the physical state of the moving clock, relative to the rest clock. But since this difference was not reciprocal in the sense of an Abellian rotation group, the implication must be that the motion of the dilated moving clock was absolute. The actual reciprocity was however consistent with the multiplicative group structure. Hence, when it is stated that the returning traveling twin has aged less than his brother, it implies a measurement, or comparison with the age of the stay-at-home twin. If the traveling twin is younger, then it follows from the properties of numbers, as a result of assigning a numeric magnitude to the concept of age, that the stay-at home twin is older than his brother. But in the mathematics of the rotation group, this result is contradicted, because the predicted result is that the two twins are the same age. Hence to claim that one of the twins has aged relative to the other twin implies a contradiction with the mathematical formalism of relativity.

This caused a lot of trouble for the advocates of Einstein relativity, who were forced to dream up various ways to explain it. This resulted in the assertion that in the context of the twins paradox, the motion of the traveling twin was not equivalent to the stay -at-home twin because the dynamical histories of the two were different. This created a diversion away from the main issue, and managed to perpetuate the argument by complicating it. Dingle was the first to face this problem with the resolve that it was

irrelevant and he eventually forced the issue into the open. The result was a curious absurdity. The proponents of Einstein relativity began asserting that Einstein's theory implied that dynamic effects were asymmetrical, a contradiction of its fundamental postulate

When we examine Einstein's original position, it was based upon the combination of the idea of a relative space-time in combination with an operational method that was solipsistic or observer dependent. This asserted that what was real was real to the observer. Since he measured a length contraction and time dilation for physical processes in a relatively moving reference frame, and the rest observer saw no change, then the effects were real, in a solipsistic sense, for each of them but not the other. This conclusion was initially not accepted by philosophers who rejected it. Curiously physicists accepted this and it became established physics. Once this happened it seems many philosophers followed along despite its absurdity for a philosophy of physics.

The problem seems to be that the solipsistic position can not be established as a mathematical formalism as Einstein and his followers believed. It is the failure to construct a mathematically consistent formal model that has doomed the special theory of relativity, despite the fact that traditional relativists continue to claim that this is incorrect. This is where Dingle made the big advance. He demonstrated that the mathematical formalism was formally inconsistent, and this proof has never been refuted despite the refusal of traditional physicists to accept this conclusion. The mathematics stubbornly refuses to comply to the demand that it succumb to solipsism. The mathematics continues to insist that an observer independent reality be assigned to the mathematical symbols and all attempts to make it consistent with the solipsistic interpretation of relativity have failed.

This author believes that relativists tried to solve this problem by the change in view that shifted from a relativistic to an absolutistic viewpoint. The following official answer to this problem illustrates the point that the problem is resolved by obfuscation and deliberate confusion of the issue, while actually shifting from a relativistic to an absolutist position.

> "The perception of paradox is rooted in a misunderstanding of the meaning of equivalent frames in relativity and therefore arises in both SR and GR. The Principle Of Relativity states that the mathematical forms of the laws of physics – say, mechanics and electrodynamics — are identical in all frames of reference independent of their relative motion; i.e., all frames are **equivalent** in this restricted but important sense that the laws of physics are **invariant** from one frame to another, whether the frames are accelerating or not. In the twin problem, although the respective frames are equivalent in this sense, they are **not** dynamically symmetric since only the traveling twin experiences acceleration. However, if one assumes that the frames of the traveling and stay-at-home twin are dynamically symmetric and confuses dynamic symmetry with equivalence (and perhaps, additionally, falsely infers equivalence to mean identical

calculations in all frames), one erroneously concludes the same result for each twin's time dilation as calculated by the other twin; i.e., one expects the traveler upon return, to have aged more **and** less than his twin – which is clearly impossible. In this connection, it is important to understand that relativity does not claim that all observers make identical measurements when observing the same phenomena; generally they do not. Nor does relativity claim that a time dilation calculation that each observer performs for his twin is a "law of physics" that must remain invariant from one observer or frame to another. However, these calculations *would* be expected to be identical for dynamically symmetric frames!"

"The erroneous belief that the twins are in dynamically symmetric frames is likely rooted in Einstein's attempt to formulate a theory in which physical phenomena could be fully explained in terms of relative motion. In his landmark 1905 paper, "On the Electrodynamics of Moving Bodies", when offering a *motivating* example for his Principle of Relativity, Einstein states that it is immaterial whether one considers the coil or the magnet as moving, and that only relative motion matters since the resultant induced current is the same. Thus, part of the misconception of what the Principle of Relativity *means* — which is essentially responsible for the perception of "paradox" — probably stems from these comments. That is, Einstein's casually–stated claim that all motion is relative (as well as his original objective for relativity theory), can easily mislead in its suggestion that equivalent frames (with respect to invariance of the laws of physics) are necessarily symmetric with respect to motion."

"Although the paradox is necessarily implied if one assumes dynamic frame symmetry, showing that it is non-existent due to the acceleration of one twin is just a necessary condition for resolution of the paradox, but not by itself sufficient. For sufficiency, one must perform the calculations to demonstrate that from the point of view of *each* twin, the traveler returns younger. Moreover, this must be done *independently* in both SR and GR, since the problem appears in both theories."

"In a 1918 paper, Einstein reacts to objections to his relativity theory and issues arising in connection with the twin paradox. In that paper he reconfirms the differential aging prediction of special relativity, and points out that the equations of special relativity are only valid for inertial frames, that one twin is in an accelerating frame (if modeled in one frame throughout), and that the twins are not in symmetric frames for the reasons explained above. Next, after affirming the general principle of relativity, he sets out to show in a detailed example with clocks, that general relativity yields the same answer as special relativity and he claims that he thus "fully explained the paradox"."

In other words, the theory of relativity is not relativistic at all, and this misunderstanding is an error on the part of critics of the theory. But if this is true, then why call it the theory

of relativity? Why did Einstein deny the ether? Why was Lorentz's theory wrong, etc, etc.?

The reason for the shift was discussed above. The main proof of relativity is its prediction of time dilation, and that result can only be experimentally demonstrated by showing an asymmetric or differential aging rate between two relatively moving clocks. Once this has been done, it is mathematically impossible to make this result consistent with the Poincare-Minkowski mathematical formalism, which forms the basis of Einstein's mathematical theory. (Unless, of course, one adopts the solipsistic viewpoint that what is real is real for the observer who observes it.)

It is fairly easy to see after reading the above "official explanation" why Dingle set himself the task of exposing this absurd travesty of pseudo science that goes by the name of the theory of relativity. (It isn't really relative after all.) Dingle's great achievement was to show that the Poincare-Minkowski formalism of space-time results in a contradiction when it is used to predict time dilation. Hence time dilation can only be consistent with a mathematical formalism which models an absolute space and time. Unfortunately, this formalism is not the one embraced by Einstein that is contained in physics textbooks. Hence, it is not the theory of relativity as expressed verbally which is false, but the mathematical formalism with which the theory is mathematically represented. (The reader should note that this ignores the fact that the traditional viewpoint continues to claim that space and time are relative, while teaching conclusions which can only be valid if this claim is false.)

## 8.0 Dingle's Research Program: Refuting The Official Explanation Of The Twins Paradox

Up until 1958, Dingle had steadfastly adhered to a relativistic viewpoint. This view claimed that there could be no difference between the ages of the two twins upon the return of the traveling twin, because the essential claim of the theory was that time and space are relative and there was no physical reason for one clock to run slower than the other. This did not dispute the validity of time dilation as an observer dependent reality, such that each of the twins would see the other aging slower than himself until, upon reunion, they both observed each other to be the same age. Traditional relativists, however, claimed a real difference in age upon reunion, and this claim did not square with the relativistic foundations of the theory in Dingle's analysis. The asymmetric claim implied an absolute space and time, which was in violation of the principle of relativity. So Dingle opposed this claim. In 1958 he changed his mind about the validity of relativity.

## 8.1 McCrea's Letter Makes Special Relativity Non-Relativistic

That change was the result of McCrea's watershed letter to the editor of Nature published in the April 28, 1951 issue. That letter triggered nearly two decades of controversy over the twins paradox and the validity of special relativity. As noted in the historical section,

that letter attempted to redefine the clock paradox so that "there really is no paradox." The importance of this letter goes well beyond the simple goal of immunizing special relativity from the criticism of paradox with regard to time dilation. It signals a shift in physical interpretation that abandoned the fundamental principles contained within Poincare's principle of relativity. That principle was the fundamental equivalence of reference frames in relative motion, so that the laws of physics were equivalent in all of them. But there was in this principle an additional requirement that was never clearly stated, and this failure enabled the change in physical interpretation advocated by McCrea and later adopted by the physics establishment. That requirement is that the standards of measure, or measurement units, be identical for all inertial coordinate systems.

The shift in physical interpretation signaled by McCrea's letter did not accompany a change in mathematical formalism which continued to be the space-time formalism of Poincare and Minkowski. Indeed it seems that McCrea's shift in physical interpretation was forced upon him by the failures of that formalism and by the erroneous ideas contained in Einstein's 1905 paper. In that paper Einstein clearly stated that time as measured on a moving clock was slow relative to a stationary one. In later papers this claim was eliminated, but the basic idea stuck, and as a result it was a source of criticism aimed at the theory. The reason was that the claim clearly implied that the theory was inconsistent with the fundamental postulates upon which it was based. Hence the need to remove this flaw. But what is most curious, is that the means selected to do this was the abandonment of the very principle that was the inspiration for the name of the theory, relativity. Hence the shift in physical interpretation required the abandonment of the principle of relativity without really making it clear that this was actually what had happened. The attempt was not initially successful.

### 8.2 Dingle's Reaction To McCrea's Change In Physical Interpretation

The preceding section has discussed the reasons that led Dingle to the view that the theory of relativity was unsound. This was clearly the result of the controversy over the twins paradox, which brought into clear focus in Dingle's mind the contradictory nature of the establishment position. Dingle's position was that it was not simply a question of abandoning the fundamental principles at the foundation of the special theory, simply to explain away a paradox created by a fundamental misinterpretation created by Einstein's ambiguous pronouncements. For Dingle, the integrity of the theory was as important as the perception that it was correct. Hence he steadfastly held to a rigid relativistic physical interpretation until he reluctantly concluded that the theory was fundamentally flawed and should be completely rejected.

To see why Dingle reached this conclusion we need to look at his detailed analysis published in his paper "A Problem in Relativity Theory", which appeared in the Proceedings of the Physical Society, Section A in December 1956. This paper has been ignored and neglected. As a result, Dingle's analysis has not been studied, and instead a myth has been promoted that Dingle's objections to relativity were unfounded. The 1956 paper states clearly the reasons why McCrea's arguments should be rejected, and

demonstrates that Dingle continued to hold firmly to the principle of relativity as advocated by Poincare. But as has been noted elsewhere, that conception had been gradually displaced as the principle of relativity by a slightly different, but conceptually significant, change in emphasis by Einstein and his followers.

That change facilitated the new physical interpretation advocated by McCrea, which claimed that relative motion caused the moving clock to run slow, and that this effect was not observer dependent, but was an objective fact for all observers. This interpretation had been immediately disproved as inconsistent with the principles of special relativity by Herbert Ives, but his refutation was ignored. So when Frank Crawford published his claims based on McCrea's obviously faulty analysis, Dingle felt the need to enter the controversy, by reiterating the fact that the conclusion was inconsistent with the fundamental principles upon which the theory was based. This is the main point of Dingle's 1956 paper. But there is within this paper the source of Dingle's later criticism of the theory which is based upon a completely different approach to the problem. That source is the method of analysis which Dingle uses to define and analyze the twins paradox problem.

**8.3 Dingle's Change To A Conviction That Relativity Is Flawed**

This seems to have occurred in the year 1958. Since it is in December of that year that his first proof of the mathematical flaw inherent to the theory appeared. Later Dingle called it a inconsistency, but it was clearly a mathematical contradiction that invalidated the formal mathematical structure of the theory. Unfortunately, Dingle left no detailed published record of how he came to this realization. Thereby creating an important project for an historian to ascertain by a careful study of Dingle's private papers and research notes. In the following, the author gives his version of why Dingle left the church of relativistic physics.

Dingle's change in approach, which was initiated in a 1958 paper published in the Bulletin of The Institute Of Physics, December 1958, pp. 314-316, may have resulted from the publication in 1957 of the book Electromagnetism And Relativity written by E.G. Cullwick. In chapter 5 section 7, Cullwick discusses the twins paradox and gives a very precise and correct analysis of the entire problem. It is certain that Dingle read this because he cites this work in his 1958 paper. It seems clear that Dingle found Cullwick's arguments to be persuasive. Cullwick presents a correct solution which clearly demonstrates that the traditional relativistic version of twins paradox is fallacious.

There are several important features of this obscure paper. First, Dingle uses the method for comparison of clock times pioneered in his 1956 paper to show that there is a contradiction in the results for two different relatively moving reference frames. He says: "Hence the difference of Q-readings requires that B's scale has contracted and the difference of P-readings that it has expanded, relatively to A's. But the existing theory requires that it has uniformly contracted: whether the contraction is "real" or "conceptual" is immaterial here. Hence the existing theory needs amendment." This is the first instance

of the claim, later refined to the following simple statement, that the theory requires that each of two clocks runs slower than the other. Dingle goes on the error lies in the assumption that the velocity of the single beam of light is c relatively to both A and B." Hence he rejects Einstein's second postulate. At the end of the paper, Dingle disowns some aspects of his previous work: "In my discussions of individual problems, however, it was necessary to compare such clocks, and as I have done so in accordance with the orthodox view, the resulting comparisons I must now disown, as also I do the orthodox Doppler effect formula which I have used." Certainly this is a decisive break with the establishment view that the theory is unquestionably correct.

After having disowned the accepted relativistic Doppler effect formula, Dingle set to work to discover the correct equations. In 1960 Dingle published a two part paper in The British Journal for the Philosophy Of Science titled "The Doppler Effect and the Foundations of Physics": Vol. 11, No. 41 (May 1960) and Vol. 11, No. 42, (Aug. 1960). This gives a detailed analysis of the Doppler effect problem for modern physics. It considers the problem from first principles, subjecting Einstein's theory of relativity to scrutiny along with the other candidate, Ritz's ballistic theory for light. Near the end of Part I, Dingle states his conclusion that according to Einstein's theory the Doppler effect phenomenon is "inexplicable"., and "yielding only contradictory ideas if we try to form a physical conception of what is taking place".

In Part II, Dingle begins: "At present the position is, to but it bluntly, that our conceptions are inadequate to explain the Doppler effect. Whatever theory we adopt, we can imagine situations in which we cannot predict what would be observed. Here is an example." The example which is given is one which arises from discussions of the twins paradox. This example is concluded with the statement that: "But this means adopting the ballistic theory insofar as the velocity at emission of the light is concerned, and rejecting Einstein's second postulate, that light moves with the same velocity with respect to relatively moving bodies. The only way to save both of Einstein's postulates is to suppose instantaneous transmission of the Doppler effect: otherwise one of them is bound to go." Later in the paper he restates his conclusion as follows: "It follows that the Doppler effect provides us with a phenomenon incompatible with the requirements of Einstein's theory as it is at present understood." This is followed by a restatement the clock paradox example which had originally been presented in 1956 and then later in 1958, refined to demonstrate a contradiction. The example is repeated, but in a refined manner, which makes it clearer than the presentation of 1958, with the result that there is a contradiction.

In 1958, M. Born and W. Biem published a paper, which was significant in influencing Dingle's views on the twins paradox. Dingle refers to it in the second part of his two part paper on the Doppler Effect, published in 1960. Since this author has not read this particular paper, he will give Dingle's view of it. Essentially the paper was an elaboration of the paper published by Einstein in 1918, which had become the definitive official relativistic explanation based on the General Theory. One of the significant factors in Dingle's defection seems to have been his analysis of Einstein's 1918 paper presented in the second part of his Doppler Effect paper. Dingle makes this very clear in Science At

The Crossroads where he again gives a detailed analysis of Einstein's argument.

Unfortunately Dingle's argument is not as persuasive as one would like. This author prefers his own objection to Einstein's conclusion. It is simply this. In making a round trip, the traveling twin experiences equal and opposite accelerations during his journey. Now since the accelerations increase and decrease the gravitational potential, they cause both a time dilation and a time contraction. Hence the end result of the accelerations cancels out as a result of the round trip journey. So acceleration adds nothing to the final age difference upon reunion of the twins. This is essentially the same result as Dingle obtained by a different argument. Hence he concluded that Einstein's claims made in 1918 were false. Finally, reaching the denouement, Dingle says: "We are bound to conclude, therefore, that Einstein's theory is inconsistent with the postulate of the relativity of motion."

It is clear that the analysis contained in the Doppler effect papers is that which justifies Dingle's reasons for breaking with relativistic orthodoxy. A careful reading of these papers is mandatory to the understanding of Dingle's apostasy. It was not out of pique, or an irrational action. It was based on a careful and reasoned analysis of the Doppler effect, after the inconsistency problem had arisen from his analysis of the twins paradox. I maintained his claim that the theory was inconsistent with the relativity of motion, a result which was already clearly apparent as a result of McCrea's solution of the twins paradox problem.

While we are near the end to the story of Dingle's conversion to relativistic heresy, there is one more chapter to relate. Coincident with the publication of the Doppler effect papers in the British Journal for the Philosophy of Science, Dingle published a paper entitled "Relativity and Electromagnetism: An Epistemological Appraisal", in the journal, Philosophy Of Science, Vol. 27, No. 3, (July 1960). Dingle had been busy, developing another approach to the refutation of relativity based on a method borrowed from Henry Margenau and Richard A. Mould. The method Dingle borrowed was the analysis approach that considered a theory to consist "in the sharp separation … between the mathematical symbols on the one hand and the relations between the mathematical symbols and observed quantities on the other…a physical theory includes a formal mathematical structure, plus rules of correspondence which identify selected parts of the structure with immediate experience." Dingle's thesis, was that "the rules of correspondence between the concepts of the special theory of relativity …and experience are not self consistent, so that some modification of current ideas is essential." this conclusion was the basis for Dingle's apostasy and formed the core of his campaign against the continued acceptance of the theory.

Dingle's argument is summarized as follows. "It is a matter of pure reason to show that the Lorentz transformation and its associated invariant form an entirely self-consistent system, and this has led to the false belief that the present special relativity theory therefore necessarily forms an entirely self-consistent system. When it is once realized that this does not follow, since inconsistencies may lurk in the rules of correspondence by

which the mathematical symbols are related to observations with actual physical instruments in specified circumstances, it is not difficult to find circumstances in which such inconsistencies become apparent. I have found several such, and shall here describe what seems to be the simplest of them. The conclusion must be that the present special relativity theory, in it's totality is invalid, though its mathematical basis, with different rules of correspondence, might still be acceptable." This is probably the clearest and most direct statement of Dingle's conclusion that forced him to reject the theory. The example which he then gives is familiar to those who have studied his arguments given in nature, and it will not be repeated here. Its conclusion is that Dingle decisively demonstrates a contradiction with respect to two relatively moving clocks.

Dingle's conclusion is compelling. "It is not easily credited that …the special theory of relativity should prove to be internally inconsistent, yet that conclusion seems inescapable…What Einstein succeeded in doing was to describe a new kinematics, differing from the old only in requirements then far beyond the possibility of observational test…Thus the compatibility of Einstein's kinematics and Lorentz's electromagnetism was mistaken for evidence of the correctness of the former… We realize with increasing clearness the need to subject it to a really definitive test." Having reviewed the experimental evidence, it was very clear to Dingle that this need was a problem of paramount importance, but even today, this has not yet been done.

**9.0 Summary and Conclusion**

The astute reader may have noticed that this paper was not so much about Dingle's apostasy, as about the reasons that brought this about. The argument given by defenders of the traditional relativistic view, is that Dingle's defection was the result of Dingle's misunderstanding or "misreadings" as McCrea says, and his failure to admit defeat in the twins debate. Mr. Terrell attributes it to his refusal to accept time dilation. Hence, Dingle's apostasy is his own fault for adhering to an incorrect opinion. This argument is however wrong as documented in this paper.

The historical background has conclusively demonstrated that the objections to Einstein's theory of relativity are real flaws within the theory and not the inventions of political opponents or anti-Semites as claimed by Einstein. The consistency of the conclusions by recognized experts, Bergson, Lovejoy, Ives and Dingle as well as others not mentioned here, clearly shows that Einstein's theory of relativity is logically contradictory, and therefore invalid as Dingle clearly stated. Dingle stands out because he refused to be intimidated into silence by the relativity establishment and persisted in his crusade against the absurdity of the science establishment's defense of the theory, without understanding it, or fully appreciating the fact that its appeal to experimental proof was invalid.

Prior to Dingle's famous apostasy, and very public rejection of the theory through proofs of its mathematical inconsistency, the usual approach to dissenters was to label them as anti-Semites or Nazis, make them appear foolish in the face of apparently indisputable

mathematical and scientific proof, as was the case with Bergson, or to simply ignore them as in the case of Ives. In all of these cases, what never came to be discussed was the merits of the arguments. Dingle was different because he forced the discussion to be about the content and interpretation of the theory. This revealed that there were ambiguities and logical flaws, which were primarily the result of Einstein‘s confused and ambivalent physical interpretations, and obscure and confusing statements regarding his fundamental principles. But, there was also the bigger problem that the theory was an attempt to amalgamate Einstein’s idea of time dilation, justified by his concept of the relativity of simultaneity, with the fundamentally different mathematical theory of Poincare-Minkowski. The result was a monstrous hybrid that was neither absolute or relativistic.

Dingle clearly stated his objection to the twins paradox was not the concept of time dilation, but its interpretation in terms of an asymmetric time difference, which was inexplicable in view of Poincare’s principle of relativity. Relativists have however, always interpreted his position as an erroneous rejection of the concept of time dilation, which they took to be indisputably proven by experiment. Hence they have endeavored to make Dingle appear a foolish recalcitrant, by refusing to accept the simple fact of time dilation.

Unfortunately, this reliance upon experiment as indisputable proof of the correctness of their position, blinded relativists to the contradictions within the theory which Dingle, as others before him, had exposed. The resulting dissonance of perceptions obscured the fact that the essential difference was the physical interpretation of time dilation in terms of either an asymmetrical observer-independent or symmetrical observer-dependent manner. The two cases corresponding to the Larmor-Lorentz theory and to the Poincare-Minkowski theory. When McCrea came out fully for the asymmetrical interpretation, it was clear that this was a shift from the official position, which had been the Poincare-Minkowski theory. Hence the interpretation of the twins paradox rejected the principle of relativity as Poincare expressed it. Dingle could not accept this since, a theory can not be permitted to make predictions, which are contradictory to its fundamental premises. Hence the experimental evidence is not a factor in the argument.

From Dingle’s viewpoint, if a theory produces a prediction, in this case asymmetrical time dilation, which is contradictory to one of its fundamental premises, it fails and no appeal to experimental proof can save it. For the relativists, this was certainly not the case, since they simply adjusted the interpretation of the theory to remove the embarrassment as Einstein did in his 1918 paper. Dingle now saw time dilation as a false conception, while relativists continued to hold it up as the primary proof of the theory. Dingle responded to this by an analysis of the foundation of the time dilation concept, tracing it to the relativity of simultaneity, and then deducing that this concept produced contrary time dilation predictions. The resulting bombshell, has never been accepted by relativists as a refutation of relativity, but for Dingle, this result revealed a serious mathematical flaw in the theory. His response was to disown the theory of relativity. He no longer believed in it.

Dingle's apostasy from belief in the theory demonstrates that the theory has logical flaws, that the relativity propaganda machine was unable to fully cover up and suppress. They will continue to surface, as independent experts reexamine the theory from time to time. Here we see that history definitely repeats itself. The controversy will continue until it is resolved by the realization that relativity is logically flawed and that experiment does not prove that it is correct.

The theory can no longer be defended by the method used by Einstein in his 1918 defense of the theory. That was analyzed by Dingle and was one reason he defected from relativity, when he recognized that it was defective. However, while relativity textbooks no longer use Einstein's defense based on an appeal to general relativity, they continue to appeal to the idea that as a result of a real acceleration of the traveling twin, there is a symmetry breaking that causes him to age at a slower rate. Hence the prediction of asymmetrical aging is maintained. However, Dingle showed that this is false and the analysis in this paper confirms that Einstein's analysis is erroneous. Therefore, the conclusion of asymmetrical aging is clearly refuted as a prediction of the Poincare-Minkowski theory which Einstein embraced as his own.

The only recourse is to recognize that this invalidates the entire basis of the theory, unless one chooses to reconstitute it in a manner compatible with the Larmor-Lorentz theory. Given that this ether theory fully explains the twins paradox and is also consistent with experiment, it is obvious that the relativity postulate can not be maintained and that the fundamental basis of the relativity theory must be false. This points the way towards how the theory can be saved. Remove the anti-absolute space and time rhetoric and admit that the asymmetric time dilation prediction of the twins paradox is only compatible with an absolute space and time theory.