

Herbert Dingle was Correct! Part III
The Absurdity of Arguing with a True Believer. The Dingle-Epstein Debate
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1.0 Introduction

This paper continues the analysis of the controversy between Herbert Dingle and the scientific establishment as personified by the relativity experts. In the first paper, we entered the debate in the middle rather than at the beginning. Here the objective will be to consider the arguments precipitated by Dingle's early papers and his book "The Special Theory Of Relativity".

It is important to understand several important facts about the acrimonious public debates that appeared in the scientific journals. The first one is that Dingle's views went to the heart of the difficulties that had beset the theory since its inception. The second thing is that these difficulties had been discussed by the scientific community prior to 1920, with most of the major contradictions clearly exposed before that time. But, following the eclipse expedition of 1919, when it was announced that the theory had been conclusively proved, the attitude of the physics community hardened and the theory became unquestionable dogma. The third important point is that Dingle was an ardent relativist until about 1955. At this time he participated in a debate regarding the twins paradox which caused a change in his thinking which eventually led him to the conclusion that relativity was untenable as a scientific theory. To summarize, while Dingle had been a critic of relativity as traditionally taught in the textbooks, he did not advocate that it was false until around 1960. In the first paper in this series, we analyzed his first paper to conclusively argue that the special relativity theory was false. In this paper, Dingle's views prior to his defection are analyzed.

2.0 Purpose and Objective

The primary purpose of this paper is to provide a background of insight into the context of Dingle's views on Einstein's special relativity theory. The objective will be to inquire into what Dingle believed was the correct interpretation prior to his conversion to disbelief in the late 1950s. In doing this we will uncover how the relativity establishment reacted to Dingle's arguments.

3.0 Background

Essentially the seeds for the arguments were sown by Einstein's lack of rigor and clarity in his fundamental papers. What seemed vague and unclear to some physicists was apparently perfectly clear to Einstein's followers. The failure to transmit this clarity of understanding to others before casting the theory into unquestionable dogma has dogged the theory ever since. The main problem was that the universe of physics textbook writers, professors, practical physicists, and philosophers of science like Dingle did not all receive the same message, and a dogma rule book was never passed around for everyone to read and completely understand. Essentially, the relativity theory was proclaimed as "the truth" before everyone was fully in agreement on that question. Dingle was apparently not in the room when the vote was taken.

But, neither were philosophers, mathematicians, and others who were probably surprised when it was announced that the decision had been made. When the philosophers looked at the result they didn't like it much. But, their opposition was soon overrun. By the end of the 1920s, the theory was firmly entrenched in scientific dogma. But Herbert Dingle was not happy with the way things were going. He perceived inconsistencies. What bothered him the most was that the theory seemed to contradict its own principles. So Dingle set out to fix some of the things which disturbed him and this is where our story begins around the middle of the 1930s.

In a 1939 article in *Nature* titled the "Relativity of Time", Herbert Dingle initiated the first significant debate regarding the role of measurement in relativity. Dingle questioned the prevailing wisdom regarding the widely held belief that moving clocks run slow. But from the measurement viewpoint, this article stated a very different interpretation than the usually accepted concept prevalent in the scientific community. In addition, Dingle tweaked the establishment by challenging them on some very sensitive scientific beliefs concerning the interpretation of special relativity and science in general.

Probably the most sensitive issue was Dingle's subtly veiled attack on the metaphysics of relativity. At the very beginning, Dingle says "No metaphysical significance is here implied with regard to length and time" before giving his interpretation, which is the first really clear attempt to give a physically meaningful interpretation of relativity, in terms of the physics of measurement. But this was not Dingle's first attack on the relativity establishment. This was delivered in a 1937 *Nature* article titled "Modern Aristotelianism".

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. To summarize, Dingle felt uncomfortable with the growing dominance of metaphysics in science to the detriment of the experimental side of science.

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.”

It is in Dingle’s discussion of the nature of time, that makes his paper a significant contribution to the subject of this paper. Dingle asks the reader to consider what is the meaning of the symbols t and t' used in the Lorentz transformations. His answer is that these symbols represent the time scales of physics for stationary and moving systems that will be represented in the readings of ideal clocks. From Dingle’s viewpoint, the important question is the meaning of the time scales which are represented by the measurements of clocks, and not the metaphysics of space-time.

Dingle’s reaction to the pompous statements in Kennedy-Thorndike, such as the title “Experimental Establishment of the Relativity of Time“, and “we have shown that there is no effect corresponding to absolute time“, probably prompted him to ask: How can this be, if they didn’t use a clock? Dingle thought that this was all a “bit over the top“, so he published an article in Nature, which tried to bring relativity in line with the practical aspects of experimental physics. The result probably shocked him. He did not intend to refute the theory of relativity, but the strong and virulent responses were as if he had. Clearly, this was lesson one.

Lesson two was experienced after publication of his book “The Special Theory of Relativity” in 1940. It provoked another strong reaction--as if he had repudiated relativity--which he hadn’t. Dingle’s crime was that his interpretation of relativity didn’t follow the rule book. He had deviated from orthodoxy.

4.0 Précis of Epstein’s Objections

Epstein’s objection to Dingle’s book consists of the following. (1) He asserts that Dingle failed to emphasize the operational method in his presentation of the theory of relativity. Epstein says “It is the opinion of the present writer that any presentation of the theory of relativity intended for wider audiences should particularly emphasize its operational

aspect.”. (2) Epstein’s next objection goes to the heart of one of Dingle’s fundamental disagreements with the teaching of relativity. Epstein objects to Dingle’s view that time is an abstract idea and that the concept of an ideal clock is to represent the concept of time. But that relativity defines time as the dial readings of a clock. So for Dingle the time concept in traditional relativity is philosophically backwards. Epstein says that “In fact time is nothing but all the successive positions of a clock, and these positions follow one another at different rates when the clock is at rest and when it is moving.” (3) He then proceeds to attack Dingle’s examples in which it is shown that three different clocks do not all measure the same time by saying “He (Dingle) claims to have established by this means a contradiction with the usual interpretation of relativity.” This is followed by a long discussion of Dingle’s clocks, with the objective of showing that Dingle is mistaken, because the theory of relativity asserts that any and all clocks must run at the rate predicted by the theory, and since Dingle’s examples don’t, Dingle must be wrong.

Having stated his objections to Dingle’s views, he proceeds to give a long exposition of time measure, and the phenomenon of time dilation in the theory of relativity. In section 4, Epstein makes the important, and for us, significant statement as follows: “We have particularly insisted that the quantities Δx and $\Delta x'$, Δt and $\Delta t'$ and so forth, represent intervals between the *same events* measured from two different frames of reference. This is contrary to the customary exposition, which usually emphasizes the circumstances that the observers A and A’ obtain *different* pictures of the phenomenon. It must be admitted that the novelty and essential interest of the theory of relativity lies in this difference of aspects. Most relativists regard the fact that both observers are watching the same happenings as so self-evident that it does not need stressing. Indeed, what relations could there exist between their observational results if they were measuring different things?” This is followed by an even more remarkable statement as follows. “Nevertheless, Dingle’s difficulties arise precisely from his failure to realize this fundamental requirement. Therefore, we repeat emphatically that the equations of the Lorentz transformation in the forms (3) and (4), *as well as all other equations of the theory of relativity* apply only to the case when the primed and unprimed symbols in them refer to the same events, which must be defined independently of any frame of reference.” (All italics are from the original, and demonstrate the emphasis that Epstein placed on these statements.)

Having established his foundation, Epstein presents the argument that a legitimate clock is one which satisfies the requirements of the Lorentz transformations for all observers. In other words, the measured time intervals between events, must agree with the predictions of the Lorentz transformation equations for all observers in order for the instrument used to be a legitimate clock. He argues that Dingle’s examples do not conform with this requirement, hence, Dingle is wrong.

To prove this he says “Of Dingle’s three contraptions of the hourglass type...only the construction (c) can be regarded as a clock, in the light of the preceding explanations...It is therefore certain that the two observers do not measure intervals between the same events, and it is impossible to see what significance their measurements can have either

for relativity or for any other scientific use.” Epstein is arguing that because it is impossible that Dingle’s clocks can behave as he claims, because that would contradict relativity, then they can not be considered as clocks. He goes on to infer that Dingle is therefore contradicting the theory of relativity in his clock examples. In a later section, we will investigate the correct interpretation and try to resolve this issue.

In section 6, Epstein returns to the old problem of the reality of the Lorentz contraction in the theory of relativity. This problem had been discussed in the early days of relativity and we have Einstein’s personal resolution of this problem on record. Epstein says that Dingle “...repeated his insistence that the relativistic contraction of solid bodies is not real but due to only the “mental attitude of the observer”.” Thereby accusing him of the error committed by V. Varicak in the famous debate with Ehrenfest. In this debate Einstein arbitrated by making the pronouncement that “The question of whether the Lorentz contraction does or does not exist in reality is misleading. It does not exist ‘in reality’, i.e., in such a way that, in principle, it could be detected by physical means, for a co-moving observer. This is just what Ehrenfest made clear in such an elegant way.”

Epstein then takes the surprising position that the Lorentz contraction is real in the same sense as in the Lorentz theory of contraction, which has frequently been dismissed as ad hoc. He discusses the 1896 theory of Morton and Searle and then the Lorentz theory of 1896 and 1905. He then discusses an example of a pendulum clock. He shows that its’ length contracts, causing time dilation. His conclusion is that “...the change of the time scale is the result of a dynamical process...Therefore it is hardly expedient to call the time dilation an *apparent* phenomenon.”

5.0 Dingle’s Rejoinder To Epstein’s Attack On His Book

Dingle’s rejoinder can be summarized in the following statements:

- (1) “Professor Epstein’s recent article...expresses with such admirable clearness a view of the special theory of relativity which I believe to be altogether mistaken...”
- (2) “I would say that a theory is not properly expressed until it is stated in terms directly applicable to the experiments it is designed to cover.”
- (3) “Epstein, however, expresses the theory in terms of purely imaginary and practically impossible observations.”
- (4) “Epstein is clearly wrong. When I use the word “clock”, I mean a time-measuring instrument which would be passed as accurate by the observatory at Greenwich or Washington...If a clock has, in addition to satisfy the test that its readings directly exhibit the Lorentz transformation, then we do not know that a clock exists, for this test is never applied.”
- (5) “I see no reason, therefore, to doubt that the account of the special theory of relativity given in my little book is correct...”

6.0 Epstein’s Rejoinder To Dingle’s Response

Epstein’s response can be summarized in the following statements:

- (1) “All this buffoonery (On Dingle’s part) is completely gratuitous...In short, Dingle’s objections against my starting point turn out altogether unfounded.”
- (2) “The answer to this question (the reality of Lorentz contraction) is the solution to the whole mystery, which turns out to be not a problem of physics but of professor Dingle’s psychology....Naturally, his remarks with respect to my reality contention are based on a complete misunderstanding and have nothing to do with it.”
- (3) “The purpose of my article was not to give a detailed criticism of Dingle’s “Special Theory of relativity” but rather to use it as an occasion for discussing a few special topics of an interest independent of Dingle’s booklet. From the many statements in the book with which I disagree, I selected only two subjects about which I disagree..”
- (4) “Dingle advances the conclusion that it is impossible to conclude anything about the transformation of the rate of clocks in relativity, “for there is in physics no explicit definition of a clock”. It is well to realize the possible implications of this statement.”
- (5) “The account which Dingle pretends to give of my criticism for the legitimacy of a clock is a complete and fantastic misapprehension of them.”
- (6) “I can say that, while storming at some imaginary charges of mine which, in reality, I had never preferred, Dingle ignores and fails to answer the actual objections which I did raise against his theory. As these objections are not drawn from thin air but are derived from an analysis of the fundamental equations of the theory of relativity, I am quite confident that they cannot be answered.”

7.0 Dingle’s Second and Last Rejoinder

In point (6) of the above section, it is clear that Epstein is attacking Dingle for giving an independent interpretation of the theory of relativity, which did not adhere to the standard interpretation. Thus, Epstein is somewhat dishonest in his statement (3) given above. But at least we now discover the real reason for Epstein’s attack. Dingle in his response (point 1), is quite candid, in stating that he does not agree with the standard interpretation of relativity. Essentially this is the entire substance of the debate. Dingle states his disagreements and Epstein states why Dingle is wrong. Dingle answers Epstein’s arguments, and quite effectively, which explains why Epstein resorts to the ad hominem attacks (See points 1,2, and 5).

Epstein’s unfortunate rejoinder offered Dingle the opportunity to peruse the argument further, and he did not let pass the opportunity to further advance his views on relativity. He answers Epstein’s primary charge (point 4 above) in the following way: “A reader of Epstein’s criticism would imagine that that I was challenging the Lorentz transformation formula, which is quite untrue. What I challenge is the idea that it will necessarily be exhibited by a clock within the meaning of my definition, which is the definition always assumed in practice. I say what a moving clock will show depends on the construction of the clock, and that if its readings do not change in the Lorentz ratio, they must be corrected in order to get the time interval according to the adopted time scale of physics. The article makes this perfectly clear.”

Dingle’s rejoinder effectively answers Epstein’s criticisms but leaves open the answers to

the actual disagreements. Before we move on to them, the following summary of Dingle's views in his last statement on the matter should be considered. Dingle says in summary: "I am sorry that his question has become so confused...Epstein is quite wrong in crediting me with a "theory" in this matter; I have none. I merely reason from facts, and show that certain widespread beliefs concerning the theory of relativity are mistaken; the theory does not require them."

8.0 Leopold Infield's Arbitration Of The Dispute

This section summarizes the arbitration article written by Leopold Infield. At the time, Infield was understood to be the protégé and close associate of Einstein, because in 1938 they were joint authors of the well known popular book "The Evolution Of Physics". Clearly it was expected that Infield's answer to the questions raised in the Epstein-Dingle debate would be the same as if answered by Einstein himself. Hence, Infield was to give an official reply to the problem of Dingle's book. However, Infield was too much of a politician to fall into that kind of a trap. He essentially avoided the polemical and more controversial aspects of the dispute. Instead, he focused upon the more technically esoteric aspect of the definition of a legitimate clock.

In the introduction Infield says that "It is with some hesitancy I take part in the discussion of certain aspects of restricted relativity...I do it at the invitation of the editor who has asked me to present dispassionately the differences between Epstein's and Dingle's views. My intention is to stick to the original two subjects; that of the behavior of a clock and the contraction of a rigid rod."

He then proceeds to, again, give an outline of the theory of relativity. The following are his major pronouncements on the debate.

(1) "Thus the question whether the rhythm of a strictly periodic clock changes or not when the clock is moved has perfect sense and the answers given to this question by classical physics and relativity theory are different. Only experiment could decide whether the classical physicist or the relativist is right; and experiment decided that the relativist is right."

(2) "Let us now take a strictly aperiodic clock and ask the same question: does the rhythm of this clock change if the clock is moved? ...the question is meaningless."

(3) "All periodic clocks show the relativistic change in rhythm. For aperiodic clocks---for example those showing time by volume or mass (these are Dingle's examples of clocks) ---the question whether or not they show the changing rhythm is meaningless."

(4) "The question is whether this (Lorentz) contraction can be called real in the ordinary sense of the word?"

(5) "I, myself agree, with Epstein, and I would call this contraction real. But I do not see how I could convince someone of this by logical arguments."

Altogether, Infield's answer is a very big disappointment. However, he did answer the requirement to declare that Dingle was wrong in his debate with Epstein, since on two occasions Infield declared his agreement with Epstein. Hence, we can understand that it

was generally perceived that Dingle “lost” the argument. (In his book “Time And The Space Traveler“, Marder generally refers to Dingle in a disparaging manner.)

9.0 The Problem Of Dingle’s Clocks

The purpose of this section is to discuss the problem of Dingle’s three clocks which do not all reflect the required time dilation effect of relativity. Dingle’s contention goes something like this. Since not all clocks exhibit the predicted relativistic time dilation, then when we say that “Moving clocks run slow’, we mean this only for clocks which do indeed conform to the relativistic time scale dilation. Epstein would call the clocks which do conform, legitimate clocks. The crux of the problem is that he is surprised that there are illegitimate clocks which do not conform to the law. He takes Dingle’s examples to mean that Dingle is contradicting the Lorentz transformation equations and thereby claiming that relativity is itself contradicted. This, however, is not what Dingle meant.

The existence of these illegitimate clocks poses a problem, which Epstein and Infield do not consider. That is the problem of whether or not the calculations which Dingle offers are correct. Since they do not dispute the mathematical transformations that lead to Dingle’s statements, it must be concluded that Dingle’s conclusions regarding these illegitimate clocks are valid, within the context of accepted conclusions of relativity. From this it indeed appears that some physical processes do not conform to the relativistic transformation laws. Here a different interpretation of this result will be given.

This writer believes that the transformation laws for length, mass, and volume used by Dingle must be incorrect. This conclusion follows from the argument given by Epstein, that the transformations must yield the required time dilation equation. Since they do not, there is an error in the traditional transformation equations of relativity. However, this is not a mistake or an error on Dingle’s part, it is an error in the traditional theory of relativity. Hence, we can not fully rely upon the transformation laws of relativity.

10.0 Disagreement Over the Meaning Of Operational Method

One the main themes of this paper is to show how Epstein’s controversy with Dingle exposed some of the major weaknesses of the traditional approach to the theory of relativity, with which Dingle disagreed. This is best illustrated in the disagreement over the role of operational method in the theory. Epstein opens the controversy with a sharp attack on Dingle’s methodological position. Epstein says “In relativity the operational approach was systematically carried through in application to the notions of time and space which, in spite of their antiquity , were lacking in scientific precision.” This idea was one of the standard themes of the relativity revolution, and Epstein considered it to be scientific gospel. But he goes on eventually revealing the inherent weakness of this viewpoint. “In particular, in relation to time, the operational approach is quite straightforward, as the theory simply insists that a moment of time is nothing but the reading of a clock and that time itself (comprising all time moments) is the totality of all possible clock readings.”

10.1 Tautological Reasoning In The Definition Of Time--When is a Clock a Legitimate Clock?

This last statement defines the essential point upon which Dingle parts company with the accepted relativity dogma. When examined closely, the statement is vacuous, and Dingle exploits this to deliver a series of telling blows from which Epstein is unable to recover, and resorts to ad hominem argumentation in desperation.

Dingle's attack upon this vacuous reasoning is simply to point out that if time is defined as "nothing but the reading of a clock" then the concept of time is rendered meaningless, unless a suitable definition of what constitutes a clock can be formulated. He then produces several clocks, which do not conform to the expected measures of time and shows that the operational definition of time used in relativity is meaningless. It is clear that Epstein's acceptance of the dogma of scientific relativism did not prepare his mind for the difficulty of explaining a way out of the circular logic into which he had obviously fallen. He attempts to recover by declaring Dingle's clocks as illegitimate, because they don't conform to the theory, and the debate devolves into an argument over the definition of a legitimate clock.

Epstein, fails to realize that his argument is entirely circular. By defining time in terms of clock readings, it then becomes crucial to define a clock that has readings, which can be considered a legitimate clock. As Dingle clearly points out, this approach is a lot easier to do "in theory" and "on paper", than it is in the actual practice of experimental physics. Essentially, the entire theory of relativity is based on an operational method which is impossible to actually perform in practice. So the theory fails on its own requirement of an operational method. The reader should note that none of the experiments claimed to provide experimental support for the theory actually employs the operation method or the definitions of time defined by the theory. In fact only one experiment (Haefle-Keating) uses actual clocks and that experiment does not employ the prescribed method of synchronization. So in practice, the operational method, upon which the theory is philosophically founded is never used. (Dingle uses this last point very effectively in his first rejoinder.)

Dingle was clearly the winner in this aspect of the debate. The dogma of relativity had so clouded the thinking of Epstein that he was unable to grasp the essential point of the debate. Dingle, had clearly deduced that the concept of time could not be founded upon the prescribed definition of time as clock readings, and he chose to found his approach to relativity on the alternate concept of the Lorentz contraction of space.

10.2 Tautological Reasoning In the Definition Of Length

Epstein's confidence in the dogma of relativity, emboldened him to attack Dingle's viewpoint regarding the reality of the Lorentz contraction. Epstein attacks Dingle for "His repeated insistence that the relativistic contraction of solid bodies is *not real* but due only

to the “mental attitude of the observer“. This phrase, presumably, refers to the fact, brought out by relativity, that there is something invariant behind the several aspects in which the same thing appears to different observers. Only that invariant thing in itself is regarded by him as real, in this sense, and not its measurements by the several observers, although their “mental attitude” is here of less account than their state of motion.” He goes on: “We think, however, that such a transcendental use of the word *real* is misleading for the beginner as it tends to obscure the fact that the theory of relativity provides *for every observer and frame of reference* a complete and self consistent world picture, including all dynamical and causal relations of the observations.” After achieving this glimpse of the basic problem, he then goes on to claim that the problem was solved by classical physics and advocates the Lorentz theory of contraction. This is a bit peculiar and very confusing. It left a big opening for Dingle to exploit and he didn’t miss the opportunity.

In his first rejoinder, Dingle takes Epstein to task for his hasty statements: “I cannot help finding it a little odd that Epstein should complain that “such a transcendental use of the word *real* is misleading for the beginner when the word is his own interpolation and my phrase is anything but transcendental. He then goes on to argue that the Lorentz contraction is “real” in the ordinary sense of the word.” having warmed up to the argument Dingle continues “Well however that may be, it is certainly not real in the operational sense of the word. To find if a rod has contracted we must compare its length now with its length before the contraction was supposed to have taken place, and this is of course an impossibility. From the operational point of view, therefore, the contraction, being unverifiable is “unreal“.”

Dingle’s last point is the relevant issue, and not the problem of whether the contraction is real or not. This has obscured what is the main weakness in Einstein’s theory of Lorentz contraction. Based on the operational method, relativists, for example Epstein, claim that the reality is the result of what results from the measurement, and this is the only reality that is important. Thus length is defined as what length measurements measure. This leads to a tautology, because what is real in physics becomes that which is measured, and as with the case of time, the definition of length becomes what is measured as real, and the supposed invariant property, length, no longer has any meaning in physics just as time becomes meaningless when it is defined as what a clock measures and what a clock measures is time.

Clearly it is easier to see the fallacy in the case of time than for the case of length. But in both cases, the phenomenon being considered is defined in terms of measurements performed in accordance with some operational method. But, the concept itself must be independent of the measurement concept, otherwise the definition of the physical quantity becomes a mere tautology. The absurdity of this can be illustrated as follows. Relativists claim that what is real is what is measured by an observer, and therefore, in this operational sense of measurement, what is real is what an observer measures. Thus if observers disagree when the measures are compared, that is unimportant because that is not a criteria of reality. Using this criterion of truth, when a mental patient claims that he

has heard commands from the dead, it must be accepted as true. Because by this reasoning there is no objective truth, only what is true for each observer.

12.0 What Dingle Actually Said In His Book

This section addresses the actual statements to be found in the referenced book, which is the subject of the controversy. The author purchased a copy of Dingle's book "The Special Theory Of Relativity", but was unable to find and adequately identify the controversial statements, which were the reason for Epstein's vociferous attack. Upon examination, it was discovered that the authors edition was not identical to the one cited in Epstein's paper. So a second copy was ordered, with the publisher specified as the Chemical Publishing Company, Inc. New York, 1941, as in Epstein's paper. This was found to be identical to the author's copy published by Methuen and Company Ltd. London, second edition 1946. This caused great consternation and surprise. How could the offending statements have been missed by the author's careful reading of Dingle's book? As far as the writer can tell, the second edition is exactly identical to the original Methuen first edition of 1940, and the Chemical company edition was printed from the same printing plates as this first edition. Yet the offending passages could not be identified.

The explanation is as follows. The controversial statements regarding Dingle's clocks appear only as a footnote on page 40, which refers the reader to the paper in the journal Nature, 144, p. 888 (1939). This is hardly likely to "cause confusion in the minds of the laymen and young students for whom it is intended", because it is only briefly mentioned in passing and not in any detail that could possibly cause confusion. Hence, the entire problem of Dingle's clocks is not actually discussed in Dingle's book in sufficient detail in order to justify an attack on the book. Clearly, the book is not the offending target at all. Its publication is merely an occasion to justify an attack upon Dingle's views, which had already been debated in the journal Nature.

What Dingle actually says on page 40 is essentially in full agreement with what Epstein says on the very first page of his attack: "According to the aforementioned operational view, this means that *the time scale is changed* for the observer moving with the clock..."(Italics in the original) Dingle says the following on page 40: "It follows that the transformation of the unit of time which we have derived is not a statement concerning the readings of clocks: it is, in fact, a statement of the change of a unit of time which we must make in our choice of a unit of time if we change our choice of a standard of rest." The author believes these statements mean essentially the same thing, so the entire controversy seems meaningless, unless there is some other motivation for Epstein's disagreement with Dingle's book.

The second topic which Epstein uses to attack Dingle's book, is his allegation that Dingle "...repeated his insistence that the relativistic contraction of solid bodies is not real but due to only the "mental attitude of the observer"." No such words actually appear in the book. What Dingle actually said was this: "The implication of this choice is often expressed by the statement that a body contracts on moving, but the expression is unfortunate: it suggests that something happens to the body, whereas the movement may

be given it merely by our mental change of standard of rest, and we can hardly suppose that the body shrinks on becoming aware of that.” Here Dingle is saying that the Lorentz transformation, which is a purely mathematical operation defined by the physicist, can be applied in an arbitrary manner for any imagined velocity relative to any observers we choose to define. His choice of language in expressing this is hardly a reason to justify Epstein’s ire. Again, what Dingle actually said in his book does not seem to justify the vociferous attack. Therefore, there must have been a different reason, beyond that which seems justified by the actual alleged transgression.

11.0 Summary and Conclusions

The subject of this paper is the attack upon Dingle’s book “The special Theory Of Relativity” by Paul Epstein in the American Journal Of Physics, February, 1941. Epstein’s attack was clearly made with the complete support of the editor, who made Epstein’s paper the leading paper at the front of the February issue, page 1. Furthermore, this was done despite the fact that the very same issue had previously been disputed in the pages of the journal Nature. So Epstein was reopening the debate in an American journal. Epstein’s excuse was that his purpose was “to use it for an occasion for discussing a few special topics of an interest independent of Dingle’s booklet.” However, this seems disingenuous to the writer, since there was no reason to attack Dingle’s book if the object was merely to discuss problems in relativity. Clearly the purpose was to discredit Dingle’s views in a sympathetic forum. In doing this Epstein failed, and it was necessary to bring in a heavyweight to bail him out of the mess he created. Infield did the best he could, but his attempt was rather lacking in passion, and he let the dispute subside, without any really clear victory over Dingle. Epstein’s attempt to discredit Dingle surely backfired, because Dingle’s book was fairly successful, being reprinted for many years, despite the attempt of the relativity establishment to kill it.

Dingle, on the other hand, used the opportunity to effectively advance his views. He clearly pointed out the main difficulties in the traditional interpretation of the theory. Although, it is clear that few, if any, American physicists were converted to Dingle’s viewpoint, he was able to clearly show that the theory was not impregnable dogma.