

Why No Einstein's Laws? Part III
Henry Poincare Founder Of The Theory Of Relativity
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1.0 Introduction

In part one of the papers with this title, the argument was advanced that the current opinion regarding the attribution of the principle of relativity to Einstein, thereby justifying the naming of this principle as one of Einstein's Laws is an erroneous conception. It has been clearly and convincingly established by historical research that Einstein was not the first to invent or discover the theory of relativity. In particular, the principle of relativity, which has been almost universally attributed to Einstein in textbooks, was certainly not solely his invention. Therefore it is erroneous to attribute to Einstein the three laws as proposed by Richard Kadel. Here this problem will be investigated in more detail and the correct attributions for the first of the three laws will be assessed.

The fundamental aspect of Kadel's proposal for the formulation of Einstein's laws is the following. Kadel is suggesting that they must contain the essence of Einstein's theory of relativity. But when we examine the proposed laws, we find that they are essentially formulations of statements made previously by others. In fact, the entire content of Einstein's theory seems to be borrowed from others, when we investigate the objective history of the subject. This raises the fundamental problem, which has to be addressed. This is the problem of what exactly is Einstein's Special Theory of Relativity. Herbert Dingle has pointed out that each of the main protagonists in the historical story had a different conception of what relativity meant. Voigt, Larmor, Lorentz, Poincare, Minkowski, and Einstein each had a different concept for the principle of relativity and attached a different meaning to this theoretical conception. Although, in all cases the main theoretical tool used was the Lorentz transformation equations.

This author believes that any attempt to specifically give to a physical concept the name Einstein's Law, requires that this law be a precise statement of the essential content of Einstein's conception of relativity. Furthermore, this statement should be unique to Einstein's specific conception, so that it is uniquely his and no others. Thereby making very clear the unique content of Einstein's discovery in physics. Unfortunately, this is more easily defined as an objective than it is to accomplish.

2.0 Background

When in 1953, E.T. Whittaker published Volume II of his comprehensive book A History Of The Theories Of Aether & Electricity, he addressed relativity in a chapter entitled “The Relativity Theory Of Poincare And Lorentz“. Because this chapter relegated Einstein’s work to a minor role, a storm of controversy erupted, despite that fact that the avowed purpose was to write a history of ether theories and Einstein’s theory was clearly not an ether theory. This marked the beginning of attempts to write the definitive history of relativity. An endeavor which has not yet been fully and comprehensively completed.

This author believes that there are two distinctly different conflicting viewpoints regarding the history of relativity. The first, which will be called the traditional view, treats Einstein’s work as the most important breakthrough in physics of the 20th century. Einstein’s relativity is viewed as the work of a great genius, who put physics on a new path towards the true understanding of space and time in physics, providing the key concept which opened the door to the great discoveries of the century. The second view, which was initiated by Whittaker, sees Einstein’s contributions within the context of the growth of physical ideas, and does not portray Einstein as the great innovator of physics as the traditional history does. It concentrates upon Einstein’s ideas as evolving from those of other workers who also made important contributions to the theory.

There is within the traditional view a hagiographic element that deserves notice. This is that it is implicitly assumed that Einstein’s theory is the only true and correct theory, and that the views of the other workers on this subject are unworthy of notice because they are incorrect physics. Hence, we should take no notice of them and address ourselves only to the correct theory of Einstein. This is, of course, nonsense, but it is actually the way the history of relativity has been written. Hence, when Whittaker slighted the theory of Einstein, which was presumed the true and correct theory by the establishment, there was an extremely angry backlash. The ensuing controversy has been a great boon to students of relativity, because without it much of the work of Poincare and Lorentz would have been consigned to obscurity. But, thankfully, this was not what happened.

The most controversial aspect of the debates centers upon the crucial aspect of priority of discovery. Einstein claimed that he independently discovered relativity. This claim has added fuel to the fires of controversy since it has been conclusively proved that this claim can not be true. But this conclusion leads to the problem of exactly what was Einstein’s accomplishment. This is, as it turns out, is in a way clear and in another way an ambiguity. The clear part is that Einstein’s main contribution was a new kinematical conception of time and space. But, this conception came with an ambiguity. It has not been clearly identified what this new conception really was. This, as it turns out, is the fundamental problem of relativity. Exactly what was this new conception of Einstein kinematics that relied upon a new metaphysics of time and space?

3.0 Lorentz and The Special Theory Of Relativity

It is obvious from Einstein's own testimony that the relativity theory of Heinrich A. Lorentz was a crucial element of Einstein's own conception of relativity. Despite this, the traditionalist histories continue to downplay the role of Lorentz's theory in Einstein's thinking. They have continued to promote Einstein's incredible claim that he knew nothing of Lorentz's 1904 paper, as if to say he owed nothing in his ideas to Lorentz. In fact the reverse is the truth. He owed everything to Lorentz and his failure to acknowledge his debt to Lorentz in his 1905 paper is disgraceful. Even more incredible is the complete denial that he borrowed anything at all from Poincare, despite the fact that he uses Poincare's words almost verbatim in his conception of the principle of relativity.

It is clear that Einstein's endeavor was completely meaningless outside the context of the work of Lorentz, because it was Lorentz who demonstrated the utility of the Lorentz transform as the primary mathematical tool of relativity. It is ironic, that it is the mathematical method of Poincare that is the modern formal mathematical structure of special relativity, but that the traditional pro Einstein histories give little importance to this fact. The main point is that Poincare developed his mathematical formalism based upon the work of Lorentz, which he acknowledged. So fundamentally it is Lorentz who developed the primary or essential idea of relativity, which is embodied in the use of his name to identify the Lorentz transformations. However, the traditional histories have nothing kind to say about Lorentz, because he failed to reject the idea of the ether or absolute space and time, and never accepted the Einstein interpretation of relativity as true.

The traditional histories of special relativity, while insisting that Einstein knew nothing of Lorentz's 1904 paper in which he derived the Lorentz transformations in their modern form, it is admitted that Einstein was aware of his earlier work. In fact, Einstein's failure to cite Lorentz theory is probably due to the fact that his theory was the only meaningful theory of electrodynamics at the time, and Einstein assuming that it was the fully accepted standard theory known to all knowledgeable physicists of the time, felt no need to cite it as a reference source.

A crucial fact, generally neglected, is that Lorentz's theorem of corresponding states, first published in 1895, is merely a different way of stating what later become identified as the principle of relativity. However, the theorem as stated by Lorentz is a specific result applicable to states of the electromagnetic field. In 1899 he published a paper in which the theorem was given as a more generalized result, but still only applied to the electrodynamics of moving bodies. A key aspect of this theorem is that the transformed time coordinate, termed the local time in the moving frame, becomes a key element of the final Lorentz transformation equations.

In effect Lorentz obtained the transformation equations: $x' = x - vt$, $y' = y$, $z' = z$, $t' = t - vx/c^2$, for space and time. The author intends to call these the Galilean transformation equations, since for non-relativistic velocities, the last term of the local time equation is effectively zero. (The author claims that these are the correct Galilean transformation equations, and

should be known by this name, but justification for this claim is outside the scope of this paper.) The transformed electric and magnetic field equations gave the now familiar results: $E' = E + V \times B$ and $B' = B - V \times E$. The first is recognized as the Lorentz force law, and the second its dual for the electric field. (Note V is the velocity and \times represents vector cross product.) Here Lorentz was only one small step away from the Lorentz transformations which differ from those given above in multiplying the right hand sides by the relativistic factor $\beta = 1/(1 - v^2/c^2)$. This last step was taken later in the same 1899 paper. (But he did not obtain the modern form which we find in Einstein's paper of 1905.)

While traditional histories claim that Einstein knew nothing of Lorentz's 1904 paper, this claim seems unbelievable to this author for the following reason. When we examine the claims of Lorentz's 1904 paper, we see it as an attempt to prove the Lorentz contraction hypothesis as an explanation for the Michelson-Morley null result. When we examine Einstein's paper, side by side to the Lorentz paper of 1904, we see that Einstein's is a rebuttal of the thesis of Lorentz's 1904 paper. Einstein specifically claims to achieve the same results as Lorentz by his different method. In this method, Einstein claims that the Lorentz contraction results from a different method of definition of the length of a moving rod, which employs different kinematic assumptions from that of "current kinematics".

There is one final point. Lorentz's method differs from Einstein's in this crucial way. Lorentz seeks to prove his theorem of corresponding states by tedious derivation of the transformation equations from simple postulated changes in the variables. His approach is thorough and exhaustive. (Some author's call it constructivist). He proves his theorem based on the Maxwell equations and by a similar method demonstrates how his hypothesis of a contraction effect rigorously follows from the Maxwell-Lorentz electrodynamic theory. Einstein on the other hand, simply postulates the theorem of corresponding states, giving it a different name, and then showing that, in combination with another unjustified postulate, the same results as obtained by Lorentz in his 1904 paper can be explained by the two postulates in combination with a different set of kinematic assumptions. Hence Einstein's approach is essentially speculative and Lorentz's is firmly rooted in established physical knowledge.

4.0 Is Poincare A Mentor Of Einstein's Philosophical Approach?

The historical record clearly shows that Einstein borrowed the approach used along with the specific form of the postulate of relativity from Henri Poincare. The traditional histories admit that Einstein was familiar with Poincare's work through his book *Science and Hypothesis*. There is firm evidence that Einstein studied this book. Whether he read and studied other works of Poincare is problematical. We simply don't know. But it is entirely possible that he learned of Poincare's ideas through others who knew of them. However, this very likely possibility, has been discounted by traditional historians who continue to promote Einstein's incredible story that he invented relativity in an intellectual vacuum. This gives rise to the myth of Einstein, as philosopher scientist,

sitting alone contemplating truth, and finding it arising out of his own genius and reflective philosophical contemplation. This, however, doesn't seem credible to this writer.

It is incredible, in this author's opinion that the traditional pro Einstein historians maintain that Einstein knew nothing of Poincare's work in substantial detail despite the fact that almost all of the substantial elements of Einstein's alternative electrodynamic theory of moving bodies were apparently borrowed from Poincare. This requires a theory of parallel development of ideas that involves too many exact coincidences to be accidental.

G. H. Keswani has stated the case simply as follows:

“To summarise: As far back as 1895, Poincare the innovator had conjectured that it is impossible to detect absolute motion. In 1900 he introduced 'The principle of relative motion' which he later called by the equivalent terms 'The law of relativity' and 'The principle of relativity' in his book *Science and Hypothesis* published in 1902. He further asserted in this book that there is no absolute time and that we have no intuition of the 'simultaneity' of two 'events' (mark the words) occurring at two different places. In a lecture given in 1904, Poincare reiterated the principle of relativity, described the method of synchronisation of clocks with light signals, urged a more satisfactory theory of the electrodynamics of moving bodies based on Lorentz's ideas and predicted a new mechanics characterised by the rule that the velocity of light cannot be surpassed. This was followed in June 1905 by a mathematical paper entitled 'Sur la dynamique de l'electron' in which the connection between relativity (impossibility of detecting absolute motion) and the Lorentz transformation given by Lorentz a year earlier was recognised.

In point of fact, therefore, Poincare was not only the first to enunciate the principle, but he also discovered in Lorentz's work the necessary mathematical formulation of the principle. All this happened before Einstein's paper appeared.”

It seems clear from the facts that Henri Poincare's theory of relativity preceded Einstein's version and that the ideas and structure of the two theories are so similar that it is impossible to maintain that Einstein did not borrow ideas from Poincare's theory to include in his fundamentally similar theory.

Because there is a fundamental similarity of philosophical ideas in Einstein's work that are remarkably similar to Poincare's, it is impossible to believe that they did not originate from Poincare's scientific philosophy. While some authors maintain that Einstein plagiarized Poincare's work, and there is a mountain of evidence to support this view, there is also the possibility that Einstein was influenced by Poincare's ideas simply by the natural process of the transmission of these ideas among his students who naturally espoused them to Einstein and his associates. Thus Einstein could truthfully state that he developed his ideas on his own but that this was done in an environment which was pervaded by Poincare's ideas. This author does not believe that Einstein developed the

theory in an intellectual vacuum, as seems to be maintained by the traditional histories, which make it appear that Einstein discovered the theory independently of any other intellectual influence.

5.0 Criticism Of The Poincare-Einstein Approach To The Principle Of Relativity

It is clear that the key element of the modern special theory of relativity is the Principle Of Relativity. That principle is stated by Einstein in many different ways in his many papers. Just as Poincare's specific words differ from Einstein's. The principle is an attempt at generalization, and as such carries within it many implicit ideas. This is at once its power and weakness. Its power is evident if one can justifiably derive an entirely new physics out of a simple principle. Its weakness is that of all generalization, the inability to address a specific case without amplification.

Einstein's second postulate is in this authors opinion contained within the principle of relativity, since the dictum that the laws of physics have the same form or be identical in difference frames implies that the constants of proportionality in the equations, in this case the light velocity constant, be numerically identical. This is actually just an amplification or clarification of the meaning of identity of form of the laws in different reference frames. The separate statement of the requirement as a second postulate is what leads to the trouble. This postulate states that the velocity of light is the same in all inertial reference frames, and this is clearly absurd. Einstein knew this and says that despite this, it is nevertheless not a contradiction. This problem was circumvented by dragging in the relativity of simultaneity and the claim that the simultaneity of events in time was relative.

This is clearly Einstein's main innovation, and it is also his primary mistake. The facts are these. The second postulate is not a principle that leads to the Lorentz transformations but a result that comes out of them. In this sense Lorentz's approach, was the correct one. Einstein uses the second postulate to justify the relativity of time, which is then miraculously derived from the Lorentz transformations, because the reasoning is circular—a tautology. However, the correct approach should be to derive the transformation of time from the Lorentz transformations as a result not an input. The correct conclusion is that the Lorentz transformations lead to the change in the time and space scales of physics, such that in terms of the new transformed time and space scale coordinates, the laws of physics remained unchanged. This being a strong form of the identity of the laws of physics. Since the scale change process results in the identity of the constants of proportionality, which are ratios, the numerical velocity of light is the same in all frames. But, since the time and distance scales are transformed into different ones, it is erroneous to say that the speed of light is a constant for all reference frames when it expressly stated that the scales of space and time are identical in all frames.

6.0 Conclusion And Final Comments

It is clear that the fundamental principle of relativity, the Principle of Relativity, did not

originate with Einstein. This principle is a generalization of Lorentz's theorem of corresponding states which was first generalized by Poincare into a principle of physics. It was clearly Poincare's genius that saw in this principle the genesis of a new mechanics and a foundation for a new kind of mathematical physics. Einstein's contribution was the improvement of that contribution.

It is a disturbing fact that science history has been infected with a pro Einstein hagiographic bias. Just as the official acceptance of his relativity theories rebuffs all criticism and refuses to entertain the notion that Einstein's theories may not be correct, the official history of science rebuffs all efforts to place Einstein's ideas within an historical context which gives due credit to others who contributed to the revolution in physics at the beginning of the 20th century. Any attempt to set the record straight has been met by entrenched resistance. Not only is it forbidden to question the truth of Einstein's theories, it is also forbidden to question the myth that Einstein alone initiated a great revolution in physics that placed 20th century physical science on a new path towards truth. Science marketing has made Einstein the archetype of the 20th century scientific thought. Numerous books, all hagiographic in tone and content, march to the same drumbeat of science marketing. Einstein is not only a great icon of the 20th century, he is the symbol of 20th century science itself. A science which has given mankind the key to the great truth's of nature. It is science, personified by Einstein, which has given this gift of "natural truth" to mankind. Viewed this way, one can easily see why criticism of relativity in any way, is forbidden. A criticism of Einstein, is a criticism of modern science and all that it has supposedly accomplished.

The point is that Einstein is no longer just a brilliant scientist who made important contributions to the stockpile of physical ideas. He is a symbol of science itself. As a symbol, his importance goes beyond his actual place in science history. Regarding Einstein the symbol, we read in the preface of a recent popular science book with the pompous title, *Albert Einstein's Vision, Remarkable Discoveries That Shaped Modern Science*, the following: "It is incredible that one person could affect science so profoundly. His insights were indeed, miraculous." The author then proceeds to credit Einstein with all the remarkable discoveries of modern physics. Einstein has become a hagiographers dream.

But if we are really interested in the truth of science history, we must acknowledge that Poincare's relativity is as much a valid foundation for what has become known to us as the special theory of relativity as Einstein's contribution to that theory. It is indeed true that neither one of them by itself can be said to be the complete theory. We need both of Poincare's philosophic insights regarding the Principle of Relativity and the principle of simultaneity before we can see Einstein's theory emerging. Poincare was clearly first to see these principles. But Einstein's insight to see how they could be combined to derive the Lorentz transformations is also needed. The main point here is to clearly understand that Poincare's relativity preceded Einstein's and that fact needs to be fully appreciated.

It is this authors opinion that it takes nothing away from Einstein's accomplishments to

fairly and correctly give an attribution of credit for Poincare's contributions to relativity and 20th century physics. Einstein has become such a gigantic icon of modern culture that attributing the name of Poincare to the principle which he was the first to enunciate, is indeed an act of justice. To call it Einstein's law is misleading and unnecessary since Einstein has already been credited with almost all of the successes of modern physics. Hence Richard Kadel's proposal on the naming of Einstein's laws would be to perpetuate an unnecessary injustice to Poincare while doing little to enhance Einstein's, already over the top, reputation.

There is at the present a clear disaffection with the fundamental ideas of 20th century physics as embodied in Einstein's "relativity", just as at the beginning of that century there was a disaffection with the ideas of Newton's mechanics. Einstein's genius was to express the dissatisfaction in the form of a new approach to physics. It is ironic that the rebellious young Einstein has now become the establishment Einstein in whose name all attempts to reform physics are rejected.