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Einstein's Relativity understood in the context of Boscovich's theory

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Translation of Einstein's Relativity gives at least two different theories where even the maths is different. Proposal here is that Einstein's relativity has not been properly understood, and that a proper understanding of it is - that it is Boscovich's theory. Galileo after the Copernican revolution introduced the concept of relativity, and then in 1905-1919 Einstein became famous for relativity, with all of the people between him and Galileo (with a few exceptions: Poincare, Lorentz) being mostly forgotten; so a proper appreciation of how relativity theory has come about has not happened; hence how it has been misunderstood by most of people in the physics community.

Concentration here shall be on Einstein's 1905 paper on special relativity (SR).

When I look at the original German in which the paper was written I find there are problems with how it has been translated into English.

I have now fortunately got two English translations of the paper to compare, and I find that two totally different theories are being presented as special relativity, even the mathematics is different. It depends on the translator as to whether one goes by theory#1 or theory#2 as special relativity.

It is the aim here to propose that what I will label as theory#2 is the correct version of relativity and that is Boscovich's theory. While theory#1 is the common misunderstanding of relativity. (Of course, one could have misunderstood Einstein's paper and come up with other theories, but for sake of ease of reading will deal with it being just two theories.)

Now dealing with two translations of Einstein's Zur Elektrodynamik bewegter Körper, in Annalen der Physik. 17:891, 1905.

First translation is: Einstein's On the Electrodynamics of Moving Bodies which appeared in the book The Principle of Relativity, published in 1923 by Methuen and Company, Ltd. of London. Most of the papers in that collection are English translations by W. Perrett and G.B. Jeffery from the German Das Relativatsprinzip, 4th ed., published by in 1922 by Tuebner. [1] -– will denote OEM

Second translation is: The electrodynamics of objects in motion, translated by A.F. Kracklauer in book Einstein in English vol. I [2] - will denote AFK

As example:

What OEM translates as: “It is known that Maxwell's electrodynamics—as usually understood at the present time —when applied to moving bodies, leads to asymmetries which do not appear to be inherent in the phenomena.”

While AFK translates as: “That Maxwell's electrodynamics— in the form currently cultivated — in the application to moving bodies leads to asymmetries seemingly not in accord with observed phenomena, is well known.”

Both OEM and AFK are saying essentially the same thing but in different ways; it is not such things as that which I have issue with, rather it is when different things are really being said. Highlights from some of those differences will now follow:

(1)

OEM says: “The observable phenomenon here depends only on the relative motion of the conductor and the magnet whereas the customary view draws a sharp distinction between the two cases in which either the one or the other of these bodies is in motion.”

AFK says: “The observed phenomenon here depend only on the relative motion of magnet and conductor, while in the usual description, they are distinctly different depending on which one is in motion.”

The issue I have here is that both translations seem confused when dealing with “relative motion”. The phrase “relative motion” is being used without explaining it, presumably when talks of “either the one or the other of these bodies is in motion” - that “motion” is with respect to observer, and observer considers “relative motion” between conductor and magnet.

(2)

OEM: “For if the magnet is in motion and the conductor at rest, there arises in the neighbourhood of the magnet an electric field with a certain definite energy, producing a current at the places where parts of the conductor are situated.”

AFK: “If the magnet is in motion while the conductor is stationary then an electric field with a particular energy density is engendered in the vicinity of the magnet, and that, in turn, generates a current in the conductor.”

OEM uses term “energy” while AFK uses term “energy density”; I am just going to excuse this as leeway.

(3)

OEM: “But if the magnet is stationary and the conductor in motion, no electric field arises in the neighbourhood of the magnet. In the conductor however, we find an electromotive force, to which in itself there is no corresponding energy, but which gives rise—assuming equality of relative motion in the two cases discussed—to electric currents of the same path and intensity as those produced by the electric forces in the former case.”

AFK: “But if the magnet is stationary while the conductor moves, then there is no electric field in the vicinity of the magnet, rather there is a force, which in itself corresponds to no energy, but which however, in view of the unity of the two situations, leads to an identical electric current in the conductor.”

OEM says, “electromotive force”, while AFK just says “force”, but what is worrying is the claim of “no corresponding energy” or “no energy” with that force. It needs clarification, but the text does not give it.

(4)

OEM: “Examples of this sort, together with the unsuccessful attempts to discover any motion of the earth relatively to the “light medium,” suggest that

the phenomena of electrodynamics as well as of mechanics possess no properties corresponding to the idea of absolute rest."

AFK: "Similar examples, together with the unsuccessful attempts to discover any motion of the earth relative the "light medium," lead to the following two propositions. One, that there are no characteristics of natural phenomena corresponding to the notion of absolute motion, not only in mechanics but also in electrodynamics; …"

It is interesting that both use term "light medium", presumably the same as what is usually called "aether".

It is worrying that one translation mentions "absolute rest" and the other mentions "absolute motion". I would not classify both those concepts as being the same and think maybe they are getting confused.

(5)

OEM: "They suggest rather that, as has already been shown to the first order of small quantities, the same laws of electrodynamics and optics will be valid just as has been for all frames of reference for which the equations of mechanics hold good."

Then gives footnote: "The preceding memoir by Lorentz was not at this time known to the author."

AFK: "Two that in all coordinate systems in which the equations of mechanics are valid, the equations of electrodynamics and optics are also valid just as has been observed, more or less."

With no footnote.

Putting aside the issue of footnote VERSUS no footnote, we have "hold good" VERSUS "more or less."

Up to this point we have had problems with understanding what is being said, but now we have mathematical difference, where one translation has it that the equations are EXACT versus they are APPROXIMATE.

Ideally a theory should not be constructed on so much ambiguity. One would hope that as one reads further on in the text that ambiguities are removed, but

instead what we have so far is just example of what is to follow, namely – no clarifications.

(6)

OEM: “We will raise this conjecture (the purport of which will hereafter be called the “Principle of Relativity”) to the status of a postulate, and also introduce another postulate, which is only apparently irreconcilable with the former, namely, that light is always propagated in empty space with a definite velocity c which is independent of the state of motion of the emitting body.”

AFK: “We will shall take these suppositions, which will be designated below as the “Principle of Relativity”) together with the seemingly incompatible notion, that light in empty space always propagates with a particular velocity c independent of its source, as hypothetical input for a new theory.”

n.b. AFK uses V not c; I have amended above so both translations have as c.

One translation says “conjecture”, the other says “suppositions”; these are not the same thing as far as I am concerned.

As per dictionary [3]: supposition is - A belief held without proof or certain knowledge; an assumption or hypothesis.

While conjecture [4] is: a guess about something based on how it seems and not on proof.

Taking what was meant as “guess”, the difference is that one “guess” is not necessarily based on what it “seems” while the other guess is based on what it “seems”. In other words- belief for principle of relativity (and later mention lightspeed constancy) is based on a “guess” but may or may not be based what it “seems” from experiments. i.e. the difference being that “guess” may or may not be based on empirical evidence. If not going by empirical evidence and just guessing based on believing whatever one likes, then is not empirical science. The confusion generated is thus whether Einstein’s SR is based on empirical evidence or just based on believing whatever one likes.

Then OEM uses word “postulate” which means [5]: postulate suggest or assume the existence, fact, or truth of (something) as a basis for reasoning, discussion, or belief.

So, OEM is using these “guesses” now as basis for reasoning, but AFK does not say that. So, have option of guesses used as basis for reasoning versus guesses not used as basis for reasoning.

Both translations admit that these two guesses don’t seem to fit together, OEM says, “apparently irreconcilable” and AFK says, “seemingly incompatible”.

OEM says: “…that light is always propagated in empty space with a definite velocity c which is independent of the state of motion of the emitting body.”

AFK says: “… that light in empty space always propagates with a particular velocity c independent of its source, as hypothetical input for a new theory.”

AFK makes out that it is a “new theory” while OEM does not say that. So, the confusion is whether one goes by existing theoretical framework (namely Newtonian physics) or not. I say it should be going by Newtonian framework because not given any clear information that it is otherwise. But OEM versus AFK translation highlights the problem that some people might think it “new” while others not think that.

Also, there is no mention of inertial frames up to this point; inertial frames are a concept that will become important later. But at this stage of mentioning lightspeed constancy, there is no clarifying that idea in the context of inertial frames. If one hopes that it will be clarified later then one hopes in vain. In my view lightspeed constancy is not constant with respect to all inertial frames, but the ambiguity so far presented here in the translations can easily lead many readers of Einstein’s relativity astray.

(7)

OEM: “These two postulates suffice to for the attainment of a simple and consistent theory of the electrodynamics of moving bodies based on Maxwell's theory for stationary bodies.”

AFK: “These assumptions suffice to arrive at a simple and consistent formulation of the electrodynamics of moving bodies on the basis of Maxwell's theory for stationary bodies.”

The difference here is that OEM is talking of a “theory” and AFK is talking of a “formulation”; so, is it just a “formulation” of Maxwell’s theory, or is it a “theory”? In the case of “theory” is it the same theory as Maxwell’s theory? Is

SR just Maxwell's theory formulated in a certain way or is it supposed to be a new theory? Once again there is no clarification.

(8)

OEM: "The introduction of a "luminiferous ether" will prove to be superfluous inasmuch as the view here to be developed will not require an "absolutely stationary space" provided with special properties, nor assign a velocity -vector to a point of the empty space in which electromagnetic processes take place."

AFK: "The necessity of introducing an "aether" for light will turn out to be superfluous; in this new formulation both an "absolutely stationary space" as well as a velocity attached to a point of space are ill conceived notions."

Both translations are deeming the aether will not be needed.

As per Einstein (1920) he admits this was a mistake [6]: "in 1905 I held the opinion, that one was forced to abandon the concept of aether in Physics altogether. This judgment, however, was too radical, as we shall see below, when considering general relativity."

Of course, his reasoning needs further investigation; but in 1920 he reverses his opinion from what he was stating in 1905. An issue I have is that many relativists still deem there is no aether; and hence seem to be going by what Einstein says in 1905 instead of what he says later.

And there are of course other issues, such as: What is supposed to be meant by "absolutely stationary space".

OEM says: no to "absolutely stationary space" provided with special properties", does that mean can have "absolutely stationary space" if it does not have special properties, or what?

While AFK says "absolutely stationary space" is an ill-conceived notion (also a velocity attached to a point of space is an ill conceived notions)- which raises the issue can the notion still be conceived even if ill conceived?

Then what is "a velocity -vector to a point of the empty space in which electromagnetic processes take place" supposed to mean, and what is "a velocity attached to a point of space" supposed to mean. Surely, it is supposed to be about coordinate systems and then when comparing different coordinate

systems moving with respect to each other are then dealing with points of those coordinate systems moving. But of course, it is all not properly clarified.

(8)

OEM: “The theory to be developed is based—like all electrodynamics — on the kinematics of the rigid body, since the assertions of any such theory have to do with the relationships between rigid bodies (systems of co-ordinates), clocks, and electromagnetic processes. Insufficient consideration of this circumstance lies at the root of the difficulties which the electrodynamics of moving bodies at present encounters.”

AFK: “The new theory, as are all variants of electrodynamics, is based on the kinematics of rigid bodies as it too concerns the relationships among rigid bodies (co-ordinates systems), clocks, and electromagnetic processes. Insufficient attention to these very factors is the cause of the inadequacies that the theory of the electrodynamics of moving bodies exhibits nowadays.”

Both translations seem to be saying much the same thing, and the conclusion they reach seem to be correct that not sufficient attention has been applied to electrodynamic theory as regard motion of bodies, and Einstein’s text seems to be doing a bad job of it.

Next Einstein wants to get onto the issue of Simultaneity, and we have:

(9)

OEM: “Let us take a system of co-ordinates in which the equations of Newtonian mechanics hold good.”

And has footnote: “i.e. to the first approximation.”

AFK: “Suppose we have a co-ordinate system in which Newton’s equations hold.”

And has no footnote.

Thus, we have scenario of: Footnote VERSUS no footnote, which boils down to one translation saying equations of Newtonian mechanics are approximations and the other translation saying it isn’t.

That's just different maths.

The footnote by OEM seems unjustified and is not in the original German paper. Thus, really the equations of Newtonian mechanics hold good without it being an approximation. What I think is lightspeed as constancy as being mere convention, thus is Boscovich's theory.

As per Karl Svozil [7] points out constancy of lightspeed is a convention and says: "not too much consideration has been given to the possibility that experiments like the one of Michelson and Morley may be a kind of "self-fulfilling prophesy," a circular, closed tautologic exercise. If the very instruments which should indicate a change in the velocity of light are themselves dilated, then any dilation effect will be effectively nullified. This possibility has already been imagined in the 18th century by Boskovich "

Svozil points out others had same idea in the context of the aether theory. (And as noted – Einstein changed his mind about aether.)

So, the correct version of SR is that it should be Boscovich's theory and any other theory that one can misread into Einstein's paper is not the correct theory.

Theory#1 that can be derived from Einstein's confused relativity paper is the common misunderstanding of relativity. While theory#2 is the correct version of relativity and that is Boscovich's theory.

When the German text of Einstein was first translated into English, then subtleties and nuances should have been sorted out, but they weren't; hence we have the misinterpretation by OEM, and what has been an ongoing mess in relativity theory.

Boscovich's theory is an extension of Newtonian physics, and in that theory Newtonian equations of motion hold good without it being an approximation, and the constancy of lightspeed is imposed on those equations as a convention.

In the maths of theory#1 the equations of SR have Newtonian physics as its approximation when speeds of moving objects are much less than c. While in the maths of theory#2 Newtonian physics is not an approximation of the SR

equations, instead SR equations is Newtonian physics with convention of lightspeed constancy imposed on it.

Of course, those who work from a belief in theory#1 then go on to place numerous mistakes piled one on top of another upon their initial mistake of misunderstanding the nature of Newtonian physics.

References

[1] https://www.fourmilab.ch/etexts/einstein/specrel/www/#tex2html1

[2] A.F.Kracklauer in book Einstein in English vol. I, 2013 isbn 978-1-304-65941-5 p.71-89

[3] https://en.oxforddictionaries.com/definition/supposition : supposition : A belief held without proof or certain knowledge; an assumption or hypothesis. E.g. 'they were working on the supposition that his death was murder', 'their outrage was based on supposition and hearsay' Origin: Late Middle English (as a term in scholastic logic): from Old French, or from late Latin suppositio(n-) (translating Greek hupothesis 'hypothesis'), from the verb supponere (see suppose).

[4] https://dictionary.cambridge.org/dictionary/english/conjectur : conjecture : a guess about something based on how it seems and not on proof: e.g. There's been a lot of conjecture in the media recently about the marriage.

[5] https://en.oxforddictionaries.com/definition/postulate postulate : Suggest or assume the existence, fact, or truth of (something) as a basis for reasoning, discussion, or belief.

[6] Einstein in English vol. II revised edition, trans. A F Kracklauer 2013, ISBN 978-304-65942-2 p. 755 Einstein: "The development of the foundations of relativity: concepts and methods"

[7] Conventions in relativity theory and quantum mechanics, Karl Svozil, Institut fur Theoretische Physik, University of Technology Vienna. https://arxiv.org/pdf/quant-ph/0110054.pdf

For further information on Boscovich see my other papers and videos etc.

e.g. From Boscovich's theory to modern quantum theory: Prof Dragoslav Stoiljkovic
https://www.youtube.com/watch?v=w1vi0yk7BvU

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