The Special Theory of Relativity

H.Dingle

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Yet another book on relativity theory. Why? This is what the author asks in his preface. The excuse he has (the book was published in 1940) is that not enough emphasis has been on the definitions of such basic notions as lengths in previous account. In science, he admonishes the reader, such concepts are based on how they are actually measured, thus it is a question not of merely verbal instruction but actual hands-on, although this is not the way he puts things. Thus he points out that many of the perceived anomalies, and hence the supposed magic, of relativity theory, are merely artefacts of the way we choose to measure things. On the other hand it has spectacular consequences, such as the conversion between matter and energy[1].

The book starts out with a rather hard core presentation of the failed experiments, failed in the sense of not confirming expectations, in this case of the variability of the velocity of light due to real motions of the source, ultimately that of the existence of an ether, a 19th century invention. Then it proceeds with a no nonsense mathematical derivations of a variety of consequences of the Lorentz transformations, such as aberration and the Doppler effect; but of course purely algebraic manipulations do not by themselves constitute understanding[2]. What you need is clear motivation of how to go from the basic postulates (relativity and the invariance of the velocity of light) to the Lorentz transformations and the meta-mathematical features of the reasoning, such as the relativity of simultaneity.

Dingle turns out not to be primarily a scientist but a historian and a philosopher of science, hence his book puts indeed more emphasis on the philosophical aspects of relativity, as hinted at above, claiming that the theory forced physicists to think more deeply and clearly about the merely analytic elements of physics as opposed to the synthetic, to use the terminology of Kant (which the author does not do). He points out that if we can imagine things differently, it means that the statement is empirical and can be tested (falsifiable in the the terminology of Popper), but statements involving definitions cannot (by definition!) be questioned. Thus in relativity theory we are forced to think of length as something defined by the method of its measuring, and thus to logically divorce it from our intuitive ideas about what length really is.

In later years Dingle turned into a vociferous opponent of relativity, claiming that it

[1] Which of course had not yet been exploited at the time of writing the book, but was on the verge of so doing

[2] Borel in his essay on Henri Poincaré and Special Relativity (L'enseignment mathématique: Tome 45, Fasc 3-4, Juillet-décembre 1999) emphasizes that Lorentz and Poincaré 'only' had a formal mathematical understanding of the theory, not a deeper physical one as did Einstein. I tried to read Einstein's original paper of 1905 and found it confusing and not as precise as I had hoped.

was logically inconsistent[3]. Being of some renown, physicists felt the need to take note of him, but dismissed him as stupid and ignorant, if not necessarily in those very words[4].

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[3] One may consult his notorious book 'Science at the Cross-roads, which is of course rather entertaining, at least initially but reveals him as somewhat of a crank. The introductory example of Einstein, admittedly not too clearly presented, about clocks being synchronized in a 'resting' frame but not in a moving one, is indeed a contradiction as Einstein had worked out (it is indeed naive to the point of arrogance, to assume that Einstein had not worked out for himself the calculations Dingle accuses him of not have been doing) and which forces us to reconsider time itself in various systems,

[4] According to Max Born, "Dingle's objections are just a matter of superficial formulation and confusion."