Translation into English: Chapter 2 - Catalogue of Errors for Both Theories of Relativity

from the German documentation of G.O. Mueller

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G: Minkowski's World / Error No. 4

Minkowski introduces a multitude of spaces without justifying them physically, demarcating one from another or furnishing empirical proof

Repeatedly during his 1908 lecture Minkowski makes the following statements as to his perceptions of space (cited from the 1958 reprint):

(1) there is a "space presupposed as being at rest" (p. 54);

(2) a volume of space can "find itself in a constant translation" (p. 54);

(3) space has a null point (p. 56);

(4) the volume of space can be rotated around the null point (p. 56);

(5) the space null point - and the time null point identical with it - can be displaced at will (p. 56);

(6) there are endlessly many volumes of space in the world (p. 57).

Minkowski is clearly unable to explain - or uninterested in explaining - what the null point of a physical volume of space is supposed to be, and how one is to find this null point in a physical volume of space, that one can then supposedly even displace at will. Nor does he explain how the displacement of such a null point is to be interpreted in physical terms (is the volume of space displaced with it? Are the measurable bodies existing in this space also displaced with it? Or does he only want to displace a coordinate system?). Furthermore, he fails to explain how the rotation of space is to be analyzed in terms of its physical effects, how the demarcation of one physical volume of space from another physical volume of space is to be indicated, and the physical effects, e.g. how the transition of a measurable body from one volume of space to the other is to be described. As long as all this remains unclear, Minkowski's perceptions of space remain physically irrelevant.

The diagnosis for this masterpiece is not difficult; Minkowski constructs his four-dimensional world of the time cone, just as Albert Einstein did with his three-dimensional coordinate systems, and then he confuses his construction with the physical realities. He artfully disguises the difference between his construction (null point of space) with which he can do as he pleases (displacement, rotating) and physical space, with which he cannot do as he pleases, but which he maintains he can "rotate" and find "at rest" or "in motion". Minkowski relies, then, on the inability of the public to decide between construction and reality, and has, in this respect, clearly found a sound basis.

With the division of one volume of observational space, as seen by the geostationary observer, into a multitude of volumes of space, Minkowski further developed the ideas first broached by Albert Einstein in 1905, though now addressing them directly and openly.

The mathematics allows the construction of arbitrarily many volumes of space, since it need not pay any consideration to the physical interpretation. This wins Minkowski's claims all the more favour by the relativists. It was Minkowski's clear depictions of his four-dimensional world - with cones of light (forward-cones, backward-cones), world points and world lines, space-like and time-like dimensions and the speed of light as a unit of measurement - that made a decisive contribution to the recognition of the STR by the public and in the mass media, and advanced the author to the third co-creator of the theory, after Lorentz and Albert Einstein.

If one takes Minkowski's speculations seriously, at the physical level, one comes to the following conclusion: space is to have a null point; this must itself obviously exist in space; when he moves the null point, he moves the null point of space through this same space; if when moving the null point space itself is moved, then one volume of space is moved through the other, or a volume of space is moved through itself. If he rotates space around its null point, the same occurs corresponding to the movement; the rotating of space through another space, or through the same space. On moving and rotating the volumes of space the physical fates of the measurable bodies in the existing volumes of space must still be examined, as must the physical fates of the existing (gravitational, magnetic, and electric) fields.

The rotation of the physical volume of space is naturally still much better, since, if the measurable bodies are also to be rotated, this gives rise to those funny old centrifugal accelerations that the "rotator" of space produces at will! Physics has never been more fun. The mathematician Minkowski does not, of course, concern himself with such physical problems. He has himself stated for the record, however, that he was fully aware of what he was doing (p. 60), referring on the other hand, to Albert Einstein: "To stride over the concept of space in such a way can probably only be assessed as a piece of daring mathematical culture."

Even the physical critics could not have put it any better. They accuse the relativists, from Albert Einstein and Minkowski up to the great luminaries of the present day, only of this daring disregard of the physical circumstances. In 1908 Minkowski had still triumphantly celebrated the "daring", as though physics was all about winning a victory through boldness and daring (victory over whom?).

Minkowski, Hermann: Raum und Zeit : Lecture, 80. Naturforscher-Vers., Köln 1908, 21st Sept. In: Naturforschende Gesellschaft, Cöln. Verhandlungen. 80. 1909, pp 4-9. Also in: Physikalische Zeitschrift. 20. 1909, pp 104-111. Reprinted in: Das Relativitätsprinzip. Lorentz, Einstein, Minkowski. 6th edition 1958, pp 54-66.