

Conventionality and Reality

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Two debates have been central in the philosophy of special relativity. The debate on the *conventionality of simultaneity* was sparked by Einstein in 1905, and the debate on the *dimensionality of the world* was initiated by Minkowski in 1908. Both debates have raged ever since. Yet, interestingly, the link between them has rarely been explored.

Important exceptions are Weingard, Petkov, Ben-Yami, Cohen and Sklar. Radically different conclusions were reached however about the way the former debate impacts the latter. According to Weingard [1] and Petkov [2–3], the conventionality thesis lends further support to the claim that the world is four-dimensional. Ben-Yami [4] and Cohen [5] disagree and argue for the opposite thesis, whereas Sklar [6] remains largely uncommitted.

The purpose of this talk is to clarify the current situation by further exploring what implications (if any) the conventionality of simultaneity has for the debate on the reality of spacetime.

In the first part of my talk, I focus on the (in)famous *Rietdijk–Putnam argument* for the four-dimensionality of the world [7, 8]. Drawing on the work of Peterson and Silberstein [9], I reformulate the Rietdijk–Putnam argument in order to make its structure more explicit, and thereby expose the different assumptions that go into the argument.

I then turn to the various objections that have been raised against it. After briefly reviewing the *transitivity objection*, I focus on the *conventionality objection* which is based on the conventionality thesis of simultaneity and which was first put forward by Weingard [1] in 1972 and by Sklar [6] in 1981. Since then, it has also been voiced by Cohen [5] and (apparently without knowledge of the earlier authors) by Ben-Yami [4].

According to the conventionality objection, since simultaneity is a conventional notion, reality becomes conventional too. Sklar [6] for instance argues that since “what counts as the present is only a matter of arbitrary choice, so then is what is taken as real.” As a result, the Rietdijk–Putnam argument does not even get off the ground.

I show the situation to be more subtle than that, and argue that the way in which the conventionality thesis impacts the Rietdijk–Putnam argument depends on whether the conventionality of simultaneity is an ontic or epistemic thesis. If it is an ontic thesis, the conventionality objection goes through as intended.

With regard to the epistemic position, I make a further distinction between the *agnostic* and the *ε -epistemicist*. I argue that on most epistemicist positions regarding distant simultaneity, the Rietdijk–Putnam argument remains unaffected by the conventionality objection. Only on a neo-Lorentzian reading of special relativity with a notion of absolute simultaneity, or in certain interpretations of quantum mechanics which introduce a preferred foliation of spacetime, does the Rietdijk–Putnam argument fail.

In the second part of my talk, I turn to the *Weingard–Petkov argument* for the four-dimensionality of the world [1–3]. Whereas the Rietdijk–Putnam argument relies on the relativity of simultaneity, the Weingard–Petkov argument relies directly on the conventionality of simultaneity. It therefore does not face the threat of the conventionality objection. However, I show that the Weingard–Petkov argument still suffers from the same transitivity objection as the Rietdijk–Putnam argument, and also raise a number of further objections.

I conclude that the soundness of the Rietdijk–Putnam and Weingard–Petkov arguments hinges on our interpretation of reality, and in particular on whether ‘being real’ is a monadic, dyadic or triadic relation. Whatever the case, since the reality relation does not belong to the formalism of special relativity, I concur that special relativity is unable to resolve the debate on the dimensionality of the world. Special relativity leaves the dispute underdetermined.

References

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