

3D/4D Equivalence, the Twins Paradox, and Absolute Time

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Abstract

The thesis of 3D/4D equivalence states that every three-dimensional description of the world is translatable without remainder into a four-dimensional description, and vice versa. In representing an object in 3D or in 4D terms we are giving alternative descriptions of one and the same thing, and debates over whether the ontology of the physical world is "really" 3D or 4D are pointless. The twins paradox is shown to rest, in relativistic 4D geometry, on a reversed law of triangle inequality. But considering the twins as 3D beings who age through time, the paradox implies that time passes at different rates in different reference frames, and therefore that the concept of a single global or Absolute time is unsustainable.

Keywords: three-dimensional, four-dimensional, physical objects, ontology, time, twins paradox, differential ageing

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