

Space, time, and time travel

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29.01.2019

Sfetcu, Nicolae, "Space, time, and time travel", SetThings (January 29, 2019), MultiMedia Publishing (ed.), URL = <https://www.setthings.com/en/space-time-and-time-travel/>



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This is a partial translation of:

Sfetcu, Nicolae, "Buclele cauzale în călătoria în timp", SetThings (2 februarie 2018), MultiMedia Publishing (ed.), DOI: 10.13140/RG.2.2.21222.52802, ISBN 978-606-033-148-3, URL = <https://www.setthings.com/ro/e-books/buclele-cauzale-calatoria-timp/>

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Newton supported the idea of absolute time, unlike Leibniz, for which time is only a relation between events and cannot be expressed independently, a statement in concordance with the relativity of space-time. (Crisp 2007)

Eternalism claims that the past and the future exist in a real sense, (Crisp 2007) going to the idea that time is a dimension similar to spatial dimensions, that future and past events are "present" on the axis of time, but this view is challenged. (Maudlin 2010) On four-dimensional vision, the universe is an existing space-time topology, containing everything that has happened, everything that happens and everything that's going to happen. It follows that there is no singular moment to be considered as insignificant as present. (Keller and Nelson 2010) Time travel is possible if the four-dimensional vision including the time is correct, but it is not possible if

presentism is true. William Godfrey-Smith says that "the metaphysical image underlying the discussion of time travel is that of the universe block, in which the world is conceived as extended in time as it is in space." (Godfrey-Smith 1980)

Prezientism claims that the future and the past only exist as changes, and they do not have a real existence of them, there is only the present. Thus, time travel would be impossible because there is no future or past. (Crisp 2007)

"Relativized presentism" admits that there are infinite reference frames, each of them having a different set of simultaneous events, making it impossible to distinguish a single "real" present and therefore all events in time are real - blurring the difference between presentism and eternalism - each frame of reference exists in its own reality.

According to the philosophical theory of composability, if the past *exists* in a certain way, it is not possible for it to be different. What can happen in the past is limited to what has happened, to prevent logical contradictions. (Lewis 1976)

A traditional realistic position in ontology is that time and space have existence apart from the human mind. Idealists, by contrast, deny or doubt the existence of independent mind-set objects. Some anti-realists, whose ontological position is that there are objects outside the mind, doubt however of the independent existence of time and space.

There was also a debate between the definition of space and time notions as real (absolute) objects or simple orders of real (relational) objects, backed by Isaac Newton and Gottfried Leibniz respectively (the principle of sufficient reason and identity of indiscernibles).

The conventionalist position states that there is no fact about matter, everything is decided by convention. Thus, Henri Poincaré argued that the geometry applied to a space was decided by convention.

A solution to the problem of the direction of time has a metaphysical vision, in which the direction of time results from an asymmetry of causality. A second family of solutions to this problem finds the existence of the direction of time as being related to the nature of thermodynamics (entropy). A third type of solution claims that physical laws are not symmetrical in the sense of reversing time.

Endurantism states that for an object to persist over time, it must exist completely at different times. Perdurantism claims that for a thing to exist in time, it must exist as a continual reality, considering an ensemble of all its "temporal parts" of existence.

According to the Heraclitean metaphysical conception, there is no field of the fact of a determined future, no inhabitant of the future, though it will exist. And the past is considered fixed and determined and can not be changed. The travel to the future in this context would be excluded, because we simply do not go anywhere.

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