

The Metaphysics of Time

PARADOX AND INFINITY

Benjamin Brast-McKie

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Paradox

Argument 1: If time is real, then events have A-series properties.

P1 If time is real, then events change.

P2 If an event changes, then its A-series properties are what change.

P3 If an event's A-series properties change, events have A-series properties.

C1 Therefore, if time is real, then events have A-series properties.

Argument 2: Events do not have A-series properties.

P4 If an event has an A-series property, it has every A-series property.

P5 The A-series properties are incompatible.

C2 There are no events that have A-series properties.

Argument 3: Putting these first two arguments together, McTaggard concludes:

C3 Time is not real.

Being in Time

Responses: No event has every A-series property *at once*.

- If e is present, then e *was* future and *will be* past.
- So Fe at a past time p , and Pe at a future time f .

Repost: "But every moment, like every event, is both past, present, and future."

- So $\neg Fe$ when p is present or future, and $\neg Pe$ when f is present or past.
- The response generates the same problem, yielding a vicious regress.

Vicious: Is the regress really vicious?

- Is the contradiction ever avoided, or ever preserved?
- Compare building a set U out of members which include U .

Events: It becomes extremely artificial to speak in terms of events.

- Is Fe an event?
- Also, most events seem to occur over a duration, not at a time.

Tense: Involves a mixture of tense operators and temporal properties.

- Properties cannot be iterated, so best to stick to operators.
- Let ' $\Diamond\varphi/\Diamond\varphi$ ' read 'It was/will be the case that φ '.

The Reality of Tense

Tense: Let φ be a sentence where e is the “event” of it being the case that φ :

- Replace Pe with $\Diamond\varphi$, replace Fe with $\Diamond\varphi$, and replace Ne with φ .

Inference Rules: In place of **P4** we may maintain $\varphi \vdash \Diamond\Diamond\varphi \wedge \Diamond\Diamond\varphi$.

- Also have $\Diamond\varphi \vdash \Diamond\Diamond\varphi \wedge \Diamond\Diamond\varphi$ and $\Diamond\varphi \vdash \Diamond\Diamond\varphi \wedge \Diamond\Diamond\varphi$.
- And $\Diamond\varphi \not\vdash \Diamond\Diamond\varphi$ and $\Diamond\varphi \not\vdash \Diamond\Diamond\varphi$.

Operators: To say $\Diamond\varphi$, $\Diamond\Diamond\varphi$, etc., is not to say that an event e has some property.

- Thus we need not say that Fe at a past time, nor Pe at a future time.
- No contradiction arises.

Semantics: Given a strict total ordering $\langle T, < \rangle$ of times where $x, y \in T$, consider:

- $x \models \Diamond\varphi$ iff $y \models \varphi$ for some $y < x$.
- $x \models \Diamond\varphi$ iff $y \models \varphi$ for some $y > x$.

Change: Let ‘ $\odot\varphi$ ’ read ‘There is a change as to whether it is the case that φ ’.

- $\triangle\varphi := \Diamond\varphi \vee \varphi \vee \Diamond\varphi$ expresses that it is *sometimes* the case that φ .
- $\odot\varphi := \triangle\varphi \wedge \triangle\neg\varphi$ expresses that things change (compare **P1**).

Does Time Flow?

Objection: The tense semantics does not capture the sense in which time flows.

- Suppose that $n \models \varphi \wedge \Diamond\Diamond\varphi \wedge \Diamond\Diamond\varphi$ where n is the present time.
- So $x \models \Diamond\varphi$ and $y \models \Diamond\varphi$ for some $x < n < y$.
- But these claims are permanent, i.e., they never change.

Impermanence: The metalinguistic claims about our language need not change.

- What changes are the claims made in the object language.
- Letting $\nabla\varphi := \neg\triangle\neg\varphi$, one might claim $\nabla\exists p(p \wedge \neg\Diamond p \wedge \neg\Diamond p)$.
- Or consider the more radical claim $\nabla\forall p(p \rightarrow \neg\Diamond p \wedge \neg\Diamond p)$.

Space: It would seem something similar may be said about space.

- Consider the poker where every point along it has a temperature.
- Let ‘ $L\varphi$ ’ and ‘ $R\varphi$ ’ read: ‘To the left φ ’ and ‘To the right φ ’.
- If $0 \models 20^\circ$, then $-5 \models R20^\circ$ and $5 \models L20^\circ$.
- Thus we have not captured the difference between time and space.

Present: Whereas space has no privileged center, time has a privileged present.

- The present is what obtains, or perhaps all that exists.
- Maybe the past also has a privileged status, and is always growing.