The Metaphysics of Time

PARADOX AND INFINITY
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Ameliorating Intuitions

Time: Calling something a theory of time does not make it a theory of time.

- Must fill the appropriate theoretical role, conforming to a significant extent with our intuitions.
- Compare a theory of sets that rejects extensionality.
- Or a theory of identity that rejects reflexivity.

Pre-Theory: Intuitions correspond to common ways of speaking about time.

- These ways of speaking serve our practical aims.
- Nothing as systematic as talk of sets used naively in mathematics.
- Our aim is to improve on this situation.

The B-Series

Earlier-Than: An asymmetric and transitive relation over events.

- The ordering of events by the earlier-than relation is called the B-series.

Events: Queen Anne's death; the poker is hot.

- Events may be understood roughly as instantaneous configurations.
- Does not capture a natural way of speaking about extended events.
- Could replace 'events' with 'states' or 'propositions'.

Russell: An event is past, present, or future only in relation to an event in time.

- Typically it is the event of assertion that we intend to relate.
- Queen Anne's death is past in relation to the present assertion event.
- But events are never past, present, or future *simpliciter*.

No Change: If e_1 is earlier than e_2, then e_1 is *always* earlier than e_2.

- The B-series does not change.
- Can a change be $\langle e_1, e_2 \rangle$ where e_1 is earlier than e_1?
- The poker being hot (e_1) is earlier than the poker being cool (e_2).

Space: Compare "change" over space.

- The tip of the poker is hot; the handle of the poker is not hot.
- But the poker need not change for this to be true.
- How does change over time differ from "change" over space?

The A-Series

Change: Events change from being future, then present, then past.

- A-series: *past*, *present*, *future*.
- Without the A-series their is no change at all.
- Everything in time must have each of the A-series properties.

Relational Properties: Some properties include other objects.

- *Being North of London* is a relational property (includes London).
- Non-relational properties may be called *absolute*.

Atemporal: At most, A-series properties relate events to something outside of time.

- If *past* is a relational property, it does not relate two events in time.
- Let '$P(e, x)$' read '*e is past relative to x*'.
- If x is an event, $P(e, x)$ is always or never the case, so cannot change.

Spotlight: What do the A-series properties include if not other events?

- *Was in*, *is in*, *will be in* "the spotlight."
- B-series as moving through the A-series.
- A-series as moving over the B-series.
- Film projector metaphor: was projected, is projected, will be projected.

Absolute: A-series properties may just as well be taken to be absolute.

- Either way, the A-series properties are incompatible.
- $Pe \vdash \neg Ne \wedge \neg Fe$; $Ne \vdash \neg Pe \wedge \neg Fe$; $Fe \vdash \neg Pe \wedge \neg Ne$.

Paradox

Argument 1: The A-series is essential to the reality of time.

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.