

Diamonds are Forever

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1. Our thesis

DAF: Every metaphysically possibly true proposition is always metaphysically possibly true.

Given the '5' principle that whatever is possible is necessarily possible, DAF follows from

Perpetuity: Every metaphysically necessarily true proposition is always true.

- Some nominalists will regard DAF and Perpetuity as vacuously true on the grounds that there are no propositions. If they understand *quantification into sentence position*, they should replace all of our proposition-talk with that, so that Perpetuity becomes $\forall p(\Box p \rightarrow Ap)$, or in primitive notation $\forall p(\Box p \rightarrow (Hp \wedge p \wedge Gp))$. We will adopt this as a convenient symbolisation anyhow, leaving it ambiguous between this nominalist-friendly interpretation and one where 'is true' is taken as tacit.
- *Propositional eternalism* (every true proposition is always true) trivially entails Perpetuity. So we assume *propositional temporalism* (some proposition is true but not always true).

Perpetuity strikes us as obvious. But it is inconsistent with almost all well-developed theories of the interaction of tense with modality.

2. Orthodox temporal-modal model theory

\mathcal{E}_{TM} : atomic sentences; binary operators \wedge ; unary operators $\neg, \Box, @, G, H$ and N .

A model is a sextuple $\langle W, T, \alpha, \eta, <, [[\cdot]] \rangle$, such that $\alpha \in W, \eta \in T, <$ is a binary relation on T , and $[[\cdot]]$ is a mapping from sentences to subsets of $W \times T$ obeying the following principles.

$$\begin{aligned} [[\Phi \wedge \Psi]] &= [[\Phi]] \cap [[\Psi]] & [[G\Phi]] &= \{ \langle w, t \rangle \mid \forall t' > t \langle w, t' \rangle \in [[\Phi]] \} \\ [[\neg\Phi]] &= W \times T / [[\Phi]] & [[H\Phi]] &= \{ \langle w, t \rangle \mid \forall t' < t \langle w, t' \rangle \in [[\Phi]] \} \\ [[\Box\Phi]] &= \{ \langle w, t \rangle \mid \forall w' \langle w', t \rangle \in [[\Phi]] \} & [[N\Phi]] &= \{ \langle w, t \rangle \mid \langle w, \eta \rangle \in [[\Phi]] \} \\ [[@\Phi]] &= \{ \langle w, t \rangle \mid \langle \alpha, t \rangle \in [[\Phi]] \} \end{aligned}$$

Φ is *true in* $\langle W, T, \alpha, \eta, <, [[\cdot]] \rangle$ iff $\langle \alpha, \eta \rangle \in [[\Phi]]$. An argument is valid on a class of models iff the conclusion is true in every model in the class in which all the premises are true.

\mathcal{E}_{TMV} : add sentential variables p_i and quantifiers $\forall p_i$.

$[[\forall p_i \Phi]] = \{ \langle w, t \rangle \mid \langle w, t \rangle \in [[\Phi]]^* \text{ whenever } [[\cdot]]^* \text{ differs from } [[\cdot]] \text{ only in the interpretation of } p_i \}$

Observation: the argument from Perpetuity ($\forall p(\Box p \rightarrow Ap)$) to Eternalism ($\forall p(p \rightarrow Ap)$) is valid on every class of models.

3. The argument from 'now'

NOW: Every proposition is, necessarily, true iff now true ($\forall p \Box(p \leftrightarrow Np)$).

RIG_N: Every truth is always now true ($\forall p(p \rightarrow ANp)$).

NOW, RIG_N, and Perpetuity are inconsistent with Temporalism.

Proof: Perpetuity and NOW yield $\forall p A(p \leftrightarrow Np)$; with RIG_N this yields $\forall p(p \rightarrow (ANp \wedge A(p \leftrightarrow Np)))$; by the temporal K schema this yields $\forall p(p \rightarrow Ap)$, contradicting Temporalism.

RIG_N should be uncontroversial, but why believe NOW? One reason: the seeming interchangeability of 'necessarily now Φ ' and 'now necessarily Φ '. Problem: when 'now' governs a context-sensitive sentence that can be interpreted as expressing something non-eternal, this interpretation is strongly favoured.

4. An argument against NOW: contingently existing times

1. Every time is such that possibly, it is never present.
2. So the present time is possibly never present.
3. So the present time is possibly *not* present.
4. So the present time is possibly not *accurate* (such that all and only truths are true at it).
5. So the present time is not such that for every proposition p , necessarily, p is true iff p is true at it.
6. So NOW is false.

5. The argument from 'actually'

ACT: Every proposition is, always, true iff actually true ($\forall p A(p \leftrightarrow @p)$).

RIG_@: Every truth is necessarily actually true ($\forall p (p \rightarrow \Box @p)$).

RIG_@ is fine if we stipulate that we are dealing with the 'philosopher's "actually"'. But why believe ACT on this reading?

6. The argument from the metaphysics of possible worlds

Leibnizian Possibility: A proposition is possibly true iff it is true in some possible world.

Conjunction: $p \wedge q$ is true at a possible world iff p is and q is.

Negation: $\neg p$ is true at a possible world iff p isn't.

Historicity: No two possible worlds agree on all eternal propositions.

These are inconsistent with the combination of Perpetuity and Temporalism.

Proof: Let h be the conjunction of all eternal truths, and suppose p is sometimes but not always true. Then $h \wedge p$ and $h \wedge \neg p$ are both sometimes true. By Perpetuity, both are possibly true. By Leibnizian Possibility, there is a world at which $h \wedge p$ and a world at which $h \wedge \neg p$. So by Conjunction, there is a world at which h and p are true, and a world at which h and $\neg p$ are true. By Negation, the latter is a world at which p isn't true. So there are two worlds at which h is true, contradicting Historicity.

7. Charitable reinterpretations

p is *immediately necessary* =_{df} p is a metaphysically necessary consequence of the truth about which time is present. NOW becomes true if we replace metaphysical necessity with immediate necessity.

Can we, conversely, define metaphysical necessity in terms of immediate necessity + tense operators? If one could, one might be tempted to dismiss the whole debate as merely verbal.

If one rejected the contingent existence of times, one would think that a proposition is metaphysically necessary iff it is immediately necessarily always true, or always immediately necessarily true.

But given the contingent existence of times, these definitions are inadequate. And it is a substantive metaphysical question whether there is *any* string of 'always' and 'immediately necessary' operators that is equivalent to metaphysical necessity: if the set of possible times can be divided into two impossible subsets, there is none.