Tense Operators and the B-theory

Abstract

It is typically assumed that B-theorists - according to whom the past and future exist concretely and presentness is a merely relative matter - should treat standard tense operators such as ‘it was the case that’ as implicit quantifiers over instants of time, which restrict the explicit individual quantifiers in their scope to things that are located at the relevant instant. I show that this assumption leads to contradiction, and should therefore be rejected by B-theorists. I also show that this has the interesting consequence that given the B-theory, everything exists eternally.

Keywords: Metaphysics; time; B-theory of time; tense operators; cross-time relations.

1. A Familiar Story

The B-theory of time can be characterised as the conjunction of two theses, one concerning what there is and another concerning how things are.¹ The first thesis is that the past, present, and future all exist concretely. Quantifying unrestrictedly, there is something that is 1,000,000 BCE, there is something that is 1,000,000 CE, there is something that is Napoleon, and there is something that is the first woman on Mars. This thesis- or something very like it- is often called eternalism. The second thesis is that there is nothing very special about the present instant in virtue of which it is present. Let us call this thesis temporal deflationism.²

Now, temporal deflationism does not imply that there is nothing special about the present instant. For example, the present instant might be God’s favourite instant, and if it is, then it is quite special in that sense. But being God’s favourite instant is not what makes the present instant

¹ B-theorists include Mellor (1998) and Sider (2001).
² One might also want to add that according to the B-theory, instants of time are ordered by an asymmetric temporal relation of precedence. This distinguishes the view from McTaggart’s (1908) C-theory of time, an eternalist temporal deflationist view according to which instants of time are ordered, but not by temporal relations.
instant *present*. What makes the present instant present, according to the standard B-theoretic account, is just that it is the instant that is *now*. And it is very easy for the present instant to be the instant that it is now: it just has to be itself. Indeed, given that every instant is itself, it follows on the standard B-theoretic account that *every* instant is present, relative to itself. What does not follow—what temporal deflationists deny—is that some instant is also *absolutely* present, or ‘*present simpliciter*’.

I would like to tell a familiar story about the B-theory. It starts like this: eternalism and temporal deflationism give rise to a picture of reality as a concrete four-dimensional ‘block’ universe, in which eternally existing objects and events bear various permanent relations to points and regions of spacetime. Now suppose a B-theorist wants to say something general about the *contents* of this B-theoretic universe; for example, that the B-theoretic universe contains dodos. (Perhaps in order to show how her view is inconsistent with her rival’s views.) There are two ways she can do this. First, she can simply use completely unrestricted quantification to say that there are dodos:4

(1) There are dodos (formally: $\exists x Dx$)

This is something that the B-theorist’s *presentist* rival, for example, will deny; according to presentists, the past and the future do not exist, and therefore there are no dodos (although of course there were).5 Or she can make use of so-called *tense operators* like ‘it was the case that’ (formally: ‘$P$’) and ‘it will be the case that’ (formally: ‘$F$’) to say something a bit more specific about the location of dodos in the B-theoretic universe:

(2) It was the case that there are dodos (formally: $P\exists x Dx$)

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3 See, for example, Ludlow (1999, 77-78), Sider (2001, 13-14), and Smart (2008, 228-9).
4 Williamson (2003) provides a powerful positive case for the cogency of the notion of completely unrestricted quantification.
5 Presentists include Bigelow (1996), Prior (1968), and Zimmerman (2008).
In contrast to (1), this is something that the B-theorist’s presentist rival agrees with. Or, to be a bit more careful, the B-theorist and her present rival agree that sentence (2) expresses a truth in the current context. However, they disagree about exactly what that truth is. Given presentism, a current utterance of (2) expresses the proposition that it was the case that there are dodos. This is a temporary proposition - a proposition that changes in truth-value simpliciter over time - which is now true but was once false (for example, at the moment of the Big Bang). In contrast, given the B-theory (2) express the proposition that there are dodos located at some instant t earlier than the instant it is now. This is a permanent proposition - a proposition that never changes in truth-value simpliciter over time - which is, always was, and always will be, true.

According to the familiar story described above, B-theorists should hold that (1) and (2) express distinct propositions, namely, that there are dodos and that there are dodos located at some instant t earlier than the instant it is now. The reason is that it is assumed as part of the familiar story that B-theorists should hold that standard tense operators such as ‘P’ and ‘F’ are implicit quantifiers over instants, whose job it is to restrict the individual quantifiers within their scope to things located at the relevant instant. In other words, according to the familiar story, B-theorists should accept the following principle:

RESTRICTOR: The standard tense operators (‘P’, ‘F’ etc.) are implicit quantifiers over instants of time which restrict the explicit individual quantifiers (∀, ∃) in their scope to things that are located at the relevant instant

Hence the tense operator ‘P’ in (2) restricts the existential quantifier in (2) to the inhabitants of some past instant, and the sentence ends up expressing the permanent proposition that there are dodos located at some instant t earlier than the instant it is now.

The familiar story about the B-theory described above is false. In fact, B-theorists
should reject the restrictor principle, and therefore accept that the standard tense operators have no effect on the unrestricted quantifiers in their scope. It follows, for example, that sentences (1) and (2) express the same proposition: namely, *that there are dinosaurs*. In the next section of this paper I first show why B-theorists should reject the restrictor principle, and then describe one interesting consequence of their doing so.

2. Against the Restrictor Principle

The first point to note is that the B-theory does not *imply* the restrictor principle. As we saw above, the core B-theoretic theses are *eternalism* and *temporal deflationism*. It should be obvious that these theses neither singly nor jointly imply the restrictor principle. Eternalism merely states that the past and future exist concretely, just like the present. Temporal deflationism states that presentness for instants of time is always a merely relative matter. Neither of these theses takes a stand on the correct interpretation of the standard tense operators.

In fact, given certain other very plausible assumptions, we can show that the restrictor principle is inconsistent with the B-theory.\(^6\) Let us say that for all \(x\) and \(y\), \(x\) and \(y\) are *instantmates* iff there is an instant \(t\) at which both \(x\) and \(y\) are located. Then given the B-theory, the following sentence is true:

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(3) \text{There is an } x \text{ and a } y \text{ such that } x \text{ and } y \text{ are not instantmates}
\]

For example, there is no instant- no ‘maximal four-dimensional hyperplane of simultaneity’- at which both Obama and Napoleon are located. Now consider the following very plausible tense-logical principle:

\[^6\text{Williamson (2013, 16-17) describes an analogous argument for the conclusion that modal realists such as Lewis (1986), according to whom possible worlds are concrete and actuality is a merely relative matter, should reject the modal restrictor principle, according to which the standard modal operators (◊,□) are implicit quantifiers over possible worlds which restrict the explicit quantifiers in the their scope to the inhabitants of the relevant world. As Williamson notes, Lewis (1986, 6) is sensitive to the tension between the modal restrictor principle and the possibility of unrestricted quantification over the space of possible worlds.}\]
SOMETIMES: If something is the case, it is sometimes the case (formally: \( \varphi \supset S\varphi \))

The sometimes principle is the temporal analogue of the widely-held modal principle that if something is the case, it could be the case (formally: \( \varphi \supset \Diamond \varphi \)). Given the sometimes principle, (3) entails (4):

(4) Sometimes, there is an \( x \) and a \( y \) such that \( x \) and \( y \) are not instantmates

Given the restrictor principle, (4) is equivalent to the contradictory:

(5) There is an instant \( t \) such that there is an \( x \) and a \( y \) located at \( t \) and \( x \) and \( y \) are not instantmates

This argument shows that B-theorists are faced with a choice: they can either (i) deny that there are non-instantmates; (ii) reject the sometimes principle; or (iii) reject the restrictor principle. To take the first option would be to accept the conclusion that for any two things at all- e.g. Obama and Napoleon, or my birth and the Big Bang- there is some instant at which both are located. But that is absurd: my birth is never simultaneous with the Big Bang. B-theorists cannot reasonably deny that there are non-instantmates. Similarly, it is very hard to deny the sometimes principle. Given that what is not sometimes the case is never the case, to reject the sometimes principle would be to accept the absurd-sounding conclusion that something could be the case but never be the case. More generally, both the sometimes principle and its modal analogue serve a very important role in guaranteeing that whatever happens, happens in time/modal space. To reject the sometimes principle would be to sever the link between what happens and what is happens in time. It seems, therefore, that B-theorists must reject the restrictor principle.

What does the rejection of the restrictor principle mean for the B-theory? Let us begin with what it does not mean. First, it does not mean that B-theorists have to hold that sentence
(2) is false. In the absence of the restrictor principle, sentence (2) expresses the true (from a B-theoretic perspective) proposition that there are dodos. Nor does it mean that B-theorists cannot say something more specific about the location of dodos within the B-theoretic universe. The following sentence remains true given the B-theory:

(6) There are dodos located at some instant \( t \) earlier than the instant it is now

Finally, B-theorists can maintain a healthy dispute with their presentist rivals in the absence of the restrictor principle. As we saw above, according to the familiar story about the B-theory, B-theorists and presentists disagree about the truth of sentence (1) and agree about the truth of sentence (2). In the absence of the restrictor principle, this is still the case; the only difference is that now, the B-theorist holds that (1) and (2) express the same proposition (namely, that there are dodos).

Let us now describe an interesting consequence of the B-theorist’s rejection of the restrictor principle (no doubt there are many more). Consider the following thesis:

PERMANENTISM: Always, everything always exists (formally: \( \forall x \exists y \ y = x \))

If permanentism is true, everything exists eternally; nothing is ever created or destroyed. (Permanentism is the temporal analogue of necessitism, the thesis that necessarily, what exists must exist.) B-theorists in the grip of the restrictor principle will naturally reject permanentism, on the grounds that it expresses the false thesis that everything at every instant is located at every instant. For example, if I am located at every instant, then I am located at the instant of the Big Bang; but of course, I was no-where to be found at the moment of the Big Bang. However, in the absence of the restrictor principle, the tense operators in the statement of permanentism are redundant, and therefore permanentism is equivalent to the logical truth that everything is something (formally: \( \forall x \exists y \ y = x \)). Hence B-theorists can-

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7 The names for both theses are due to Williamson (2013), who argues for the truth of necessitism.
should- accept permanentism. In short, the rejection of the restrictor principle has the surprising result that given the B-theory, everything exists eternally.⁸

References


⁸ What about presentists? Presentists typically hold that the standard tense operators are ‘metaphysically basic’. Hence, while presentists also reject the restrictor principle, they do not accept that permanentism is equivalent to the logical truth that everything exists. Indeed, presentism is better characterised as a view which rejects permanentism in favour of the view that things both begin and cease to exist over time.