

# Advanced Temporalising

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## 0. Introduction

There is a widespread assumption that B-theorists (according to whom there is nothing metaphysically special about the present moment in virtue of which it is present) should interpret tense operators such as ‘it was the case that’ and ‘it will be the case that’ as implicit quantifier-restrictors – so that, for example, an utterance at the present instant  $n$  of the sentence ‘It was the case that there are dinosaurs’ is true just in case there are dinosaurs located at some instant  $t$  earlier than  $n$ . However, it is easy to show that this interpretation of the tense operators creates serious problems for B-theorists when combined with certain other natural B-theoretic commitments. In this paper, I argue that the best way for B-theorists to avoid these problems is to treat the tense operators as redundant when the sentences in their scope are *qualitative* – roughly, not about any particular individual.

The paper is structured as follows: in §1, I describe the B-theory. In §2, I show how the standard interpretation of the tense operators as quantifier-restrictors creates problems for B-theorists. I also describe the well-known analogous problem for Modal Realists (according to whom there is nothing metaphysically special about the actual world in virtue of which it is actual). In §3, I show that B-theorists can avoid these problems by rejecting the standard interpretation of the tense operators as quantifier-restrictors in favour of the view that the tense operators are redundant when the sentences in their scope are qualitative. I then describe and respond to what I take to be the most serious objection to this view, namely, that it

has highly implausible consequences given the B-theory. Finally, in §4 I describe four alternative B-theoretic strategies for avoiding the problems generated by the standard interpretation of the tense operators. I argue that there are good reasons for B-theorists to reject each of these alternative strategies. I conclude that B-theorists should prefer the strategy described in §3.

### 1. *The B-theory*

The *B-theory of time* is often characterized informally as the view that ‘time is like space’, that ‘all times are on a par’, that ‘time does not flow’, and that ‘tense is unreal’.<sup>1</sup> While there is something to be said for each of these slogans, we can make more progress by focusing on a single, clear, core B-theoretic thesis. A good candidate for such a thesis is:

TEMPORAL PARITY: There is nothing metaphysically special about the present instant in virtue of which it is present<sup>2</sup>

Temporal Parity is a thesis about the nature of the present instant *n*: it implies that being present doesn’t metaphysically distinguish *n* from other instants. Temporal Parity doesn’t imply that there’s *nothing* special about *n*, or indeed nothing *metaphysically* special about *n* – for example, it is consistent with Temporal Parity that *n* is God’s favourite instant, and

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<sup>1</sup> Contemporary B-theorists include Beer (2010), Deng (2013), Sider (2001), and Skow (2015).

<sup>2</sup> I assume that there are such things as instants (or moments) of time – ‘instants’ for short. Most contemporary B-theorists identify instants with regions of the spacetime manifold – in particular, maximal hyperlanes of simultaneity (‘hyperplanes’ for short). See, for example, Sider (2001) and Skow (2015). Strictly speaking, for B-theorists something is an instant only relative to a *frame of reference* – given the Special Theory of Relativity, there is no non-frame-relative foliation of spacetime into hyperplanes. For ease of exposition, in what follows I write as if there are instants *simpliciter* according to the B-theory, as this makes no important difference to the arguments.

therefore (plausibly) metaphysically special relative to every other instant. But even if  $n$  is God's favourite instant, given Temporal Parity, that is not what makes  $n$  present.

What *does* make  $n$  present according to the B-theory? The best way to answer this question is to ask a different but closely related question: what does 'the present instant' mean given the B-theory? According to the standard B-theoretic account, 'the present instant' is an indexical term like 'here', and means the same as 'this instant' – it refers directly to the instant of utterance on any occasion of use. It follows that given the B-theory, an assertive utterance at the present instant  $n$  of the sentence ' $n$  is the present instant' expresses the proposition that  $n = n$ . In that sense, for B-theorists the question 'What makes this instant the present instant?' is like the question 'What makes this place here?' – just as there is nothing metaphysically special about *this place* in virtue of which it is *here*, there is nothing metaphysically special about *this instant* in virtue of which it is *present*.

B-theorists defend Temporal Parity. *A-theorists*, in contrast, defend *Temporal Disparity*:

TEMPORAL DISPARITY: There is something metaphysically special about the present instant in virtue of which it is present

However, A-theorists disagree among themselves about what makes the present instant metaphysically special. For example, many *Presentists* identify instants with maximal, consistent, sometime-true propositions, and hold that the metaphysical specialness of the present instant consists of its being *true*.<sup>3</sup> Among non-Presentist A-theorists, some hold that the present instant is *the instant than which there is no later*; some that it is *the instant that*

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<sup>3</sup> See, for example, Bourne (2006), Crisp (2007) and Markosian (2004).

*instantiates fundamental presentness*; and some that it is *the accurate instant*, where an instant  $t$  is *accurate* iff for all propositions  $p$ ,  $p$  is true at  $t$  iff  $p$  is true *simpliciter*.<sup>4</sup>

We saw above that according to the standard B-theoretic account, the predicate ‘is the present instant’ as uttered at the present instant  $n$  expresses the property of being identical to  $n$ . Notice that the property of being identical to  $n$  is a *permanent property* – a property that is never gained or lost over time – and therefore that according to the standard B-theoretic account, the proposition that  $n$  is the present instant is a *permanent proposition*: a proposition that is if true, always true.<sup>5</sup> In contrast, consider the A-theorist, according to whom  $n$  is present in virtue of possessing some metaphysically special property  $F$  (such as being true or being accurate). For the A-theorist,  $F$  had better be a *temporary* (indeed, instantaneous) property of instants – otherwise, she is open to the charge of defending a view according to which ‘the present is frozen’. Hence, if the A-theory is true, there is at least one *temporary proposition* – namely, the proposition that  $n$  is  $F$  – and A-theorists must accept the thesis of *Propositional Temporalism*:

PROPOSITIONAL TEMPORALISM: Some propositions are sometimes true and sometimes false

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<sup>4</sup> The first view is held by some defenders of the *Growing Block Theory* such as Broad (1923); the second view is held by some *Moving Spotlight Theorists* such as Deasy (2015); the third view is held by e.g. Bacon (forthcoming, *Noûs*).

<sup>5</sup> In what follows, for ease of exposition I assume a Platonist view of properties and propositions. Nothing of argumentative importance rests on this.

B-theorists, on the other hand, invariably reject Propositional Temporalism in favour of *Propositional Eternalism*, the view that all propositions are permanent:<sup>6,7</sup>

PROPOSITIONAL ETERNALISM: Every proposition is if true always true

For example, according to the standard B-theoretic account, the sentence

(1) ‘It is raining in Carrigaline’

as uttered at the present instant  $n$  expresses the permanent proposition that it is raining in Carrigaline at  $n$ . Moreover, given that Temporal Disparity implies Propositional Temporalism, it follows that Propositional Eternalism implies Temporal Parity.

Temporal Parity and Propositional Eternalism are core B-theoretic theses. Is there more to being a B-theorist? According to Sider (2001, 13-14), the B-theory implies ‘reductionism about tense’, the thesis that ‘tokens of tensed sentence types... can be given tenseless truth-conditions’. What exactly does this mean? Think of a ‘tensed sentence type’ as a sentence-type whose natural regimentation is in the language of *Quantified Tense Logic* (QTL). QTL is the result of adding *tense operators* such as ‘P’ – pronounced ‘it was the case that’ – and ‘F’ – pronounced ‘it will be the case that’ – to standard first-order predicate logic.

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<sup>6</sup> Some B-theorists argue that many of our beliefs have temporary contents that can be represented by functions from instants to truth-values, or from instants to permanent propositions – see e.g. Sider (2001, 20-1) and Zimmerman (2005). However, whatever these ‘temporary contents’ are, they cannot be *temporary propositions* in the sense I have in mind here. For one thing, temporary propositions have truth-values *simpliciter* – but functions from instants to truth-values do not (at best, they have truth-values *relative to instants*). Moreover, if there are temporary propositions, there is an *accurate* instant (a unique instant  $t$  such that for all propositions  $p$ ,  $p$  is true at  $t$  iff  $p$  is true *simpliciter*). But if an instant  $t$  is accurate, then  $t$  is plausibly metaphysically distinct from all other instants in virtue of being the present instant, in violation of Temporal Parity. (This argument is due to Dorr, *Counterparts* MS). See also Russell (forthcoming, *Noûs*).

<sup>7</sup> Schaffer (2012, 8) defines ‘eternalism’ as the thesis that ‘all propositions are fully time-specific’. If this means (assuming a structured theory of propositions) that all propositions have instants or intervals as constituents, then Schaffer’s ‘eternalism’ is distinct from Propositional Eternalism, and moreover, is not a thesis B-theorists have any obvious reason to accept.

Given ‘P’ and ‘F’, we can define the further tense operators ‘H’ (‘it always has been the case that’), ‘G’ (‘it is always going to be the case that’), ‘A’ (‘it is always the case that’) and ‘S’ (‘it is sometimes the case that’) as follows:

$$H\varphi =_{def} \neg P\neg\varphi$$

$$G\varphi =_{def} \neg F\neg\varphi$$

$$A\varphi =_{def} H\varphi \wedge \varphi \wedge G\varphi$$

$$S\varphi =_{def} P\varphi \vee \varphi \vee F\varphi$$

For example, the sentence

(2) There used to be dinosaurs

is a tensed sentence – it is naturally regimented in QTL as follows (where ‘*D*’ expresses the property of being a dinosaur):

(3)  $P \exists x D x$

A simple way to understand the claim that tensed sentences such as (2) can be given ‘tenseless truth-conditions’ is as the claim that sentences such as (2) express (relative to contexts of utterance) permanent propositions. In that case, ‘reductionism about tense’ follows straightforwardly from Propositional Eternalism. However, for most B-theorists,

there is more to ‘reductionism about tense’ than Propositional Eternalism. For example, consider the sentence

(4) Sometimes, there are dinosaurs

(4) is a tensed sentence in the sense described above – it is naturally regimented in QTL as follows:

(5)  $S \exists x D x$

Moreover, the proposition that sometimes, there are dinosaurs is a permanent proposition. However, B-theorists standardly reject the claim that the relevant ‘tenseless truth condition’ for (4) is that sometimes, there are dinosaurs. The reason is that when B-theorists say that tensed sentences such as (2) and (4) can be given ‘tenseless truth-conditions’, what they typically mean is that the truth-conditions for such sentences can be stated in a language that is entirely free of tense operators. Insofar as B-theorists take this language to be more ‘metaphysically perspicuous’ than QTL, this reflects a B-theoretic commitment to the thesis of *Anti-temporalism*:

ANTI-TEMPORALISM: Tense operators are metaphysically non-fundamental<sup>8</sup>

For example, here is Sider (2011, 24):

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<sup>8</sup> Note that Anti-temporalism neither implies nor is implied by Propositional Eternalism. For example, in the left-to-right direction, Deasy (2015) defends a view that combines Anti-temporalism with Propositional Temporalism. In the right-to-left direction, one could (for example) defend a view that combines Propositional Eternalism with the thesis that the tense operator ‘S’ is metaphysically fundamental.

Spatializers [B-theorists] do not admit tense operators into their fundamental ideology, since they can describe temporal reality without them – by quantifying over past and future entities and predicating features of them relative to times. Spatializers may use tense operators in their *non*fundamental languages, since they can give a metaphysical semantics for the language of quantified tense logic in their tense-operator-free fundamental language.

In other words, ‘reductionism about tense’ implies that the truth-conditions for tensed sentences such as (2) and (4) can in principle be stated in a ‘fundamental language’ that is both free of tense operators (given Anti-temporalism) and all of whose sentences express – relative to contexts of utterance – permanent propositions (given Propositional Eternalism). It follows that the relevant ‘tenseless truth-condition’ for sentence (4) cannot be that sometimes, there are dinosaurs. More generally, it follows that for B-theorists, QTL is ‘metaphysically second-rate’, as it contains expressions – in particular, tense operators such as ‘P’ and ‘F’ – which fail to ‘carve reality at the joints’. However, as Sider indicates in the above quotation, this does not mean that B-theorists can simply bypass QTL. Rather, an important part of the B-theoretic project is to provide (as Sider 2011 puts it) a ‘metaphysical semantics’ for QTL in the B-theorist’s fundamental, tense operator-free language. The question of how best to do this – and in particular, of how to interpret the tense operators when the sentences in their scope are not about any particular individuals – is at the heart of this paper.

## 2. *Locator*

Consider the following characterization of the B-theory (‘eternalism’) due to Sider (2006, 77-8):



For the eternalist, past- and future-tensed claims are ultimately made true by claims that quantify over past and future times and entities. For instance, an assertion of ‘It was the case that  $\phi$ ’ is true iff  $\phi$  is true at some time located before the assertion. Construing (2) [‘Dinosaurs once existed’] (somewhat artificially) as having this form, the eternalist thinks of (2) as amounting to:

(2<sub>E</sub>) There exist dinosaurs, located temporally before us.

$\exists x(Dx \& Bxu)$

Note that (2<sub>E</sub>) entails that there exist dinosaurs ( $\exists xDx$ ). Presentists, on the other hand, deny that past-tense statements give way to statements quantifying over past entities. Rather, such statements involve primitive, unanalyzeable tense operators. The presentist’s rendition of (2) is this:

(2<sub>P</sub>) It was the case that: there exist dinosaurs.

$P \exists xDx$

‘P’ symbolizes the past-tense operator *it was the case that*. (Other tense operators include *it will be the case that*, and *it is always the case that*.) Inside the scope of such a tense operator, the existential quantifier is not existentially committing; that is why the truth of (2<sub>P</sub>) is consistent with presentism.

According to Sider, if the sentence ‘Dinosaurs once existed’ is regimented as

(3)  $P \exists xDx$

then given the B-theory, (3) ‘amounts to’ – i.e. express the same state of affairs as – the sentence (where ‘*T*’ expresses the property of being an instant; ‘*<*’ expresses the precedence relation between instants; ‘*n*’ names the present instant; and ‘*L*’ expresses the location-relation between instants and their occupants):

(6)  $\exists x(Tx \wedge x < n \wedge \exists y(Dy \wedge L(y,x)))$

(Informally: *There are dinosaurs located at a past instant*)

Why think this? Sider assumes that given the B-theory, the tense operator ‘P’ functions as an implicit quantifier over instants which restricts the individual quantifiers (e.g. the ‘existential’ quantifier ‘ $\exists x$ ’) in its scope to things located at the relevant instant. As Sider puts it in the passage quoted above: ‘an assertion of ‘It was the case that  $\phi$ ’ is true iff  $\phi$  is true at some time located before the assertion’. Hence the unrestricted ‘existential’ quantifier ‘ $\exists x$ ’ in sentence (3) is restricted in sentence (6) to things located at some instant earlier than now. Similarly, here is Sider (2011, 241):

Spatializers [B-theorists] may use tense operators in their *nonfundamental* languages, since they can give a metaphysical semantics for the language of quantified tense logic in their tense-operator-free fundamental language. Such a semantics will, for example, count an utterance of  $P \exists x D x$  that takes place at  $t_0$  as being true iff some dinosaur is located before  $t_0$ .

It seems clear from the above that for Sider, the B-theory implies (or at least, ought to be combined with) the following analyses of the tense operators ‘P’ and ‘F’ (where ‘ $[\phi]^x$ ’ is read as equivalent to  $\phi$  but with all quantifiers in  $\phi$  restricted to the occupants of  $x$ ):<sup>9</sup>

$$P\phi := \exists x(Tx \wedge x < n \wedge [\phi]^x)$$

*(Informally: For it to be the case that it was that  $\phi$  is for it to be the case that, restricting attention to things located at some past instant  $t$ ,  $\phi$ )*

$$F\phi := \exists x(Tx \wedge n < x \wedge [\phi]^x)$$

*(Informally: For it to be the case that it will be that  $\phi$  is for it to be the case that, restricting attention to things located at some future instant  $t$ ,  $\phi$ )*

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<sup>9</sup> In the following ‘ $\phi := \psi$ ’ is to be read ‘for it to be the case that  $\phi$  is for it to be the case that  $\psi$ ’.

Given the standard definitions of the tense operators ‘S’ and ‘A’ in terms of ‘P’ and ‘F’ (see §1 above), these analyses imply:

$$S\varphi := \exists x(Tx \wedge [\varphi]^x)$$

*(Informally: For it to be the case that sometimes,  $\varphi$  is for it to be the case that, restricting attention to things located at some instant  $t$ ,  $\varphi$ )*

$$A\varphi := \forall x(Tx \supset [\varphi]^x)$$

*(Informally: For it to be the case that always,  $\varphi$  is for it to be the case that, restricting attention to things located at any instant  $t$ ,  $\varphi$ )*

More generally, Sider appears to assume that the B-theory implies (or ought to be combined with) the following thesis:

LOCATOR: The standard tense operators (‘P’, ‘F’, ‘S’ and ‘A’) are implicit quantifiers over instants which restrict the explicit individual quantifiers (‘ $\forall$ ’ and ‘ $\exists$ ’) in their scope to things located at the relevant instant(s)

The assumption that the B-theory implies (or ought to be combined with) Locator seems to be widespread in contemporary philosophy of time, even if it is seldom explicitly stated.<sup>10</sup> And it is easy to see why this assumption is made: as we saw in §1 above, B-theorists are committed to providing a ‘metaphysical semantics’ for sentences such as

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<sup>10</sup> In addition to the evidence from Sider (2001, 2011) cited above, see Marshall (2016, 8).

(3)  $P \exists x D x$

in their fundamental, tense operator-free language – and Locator provides a natural way of reductively analysing the tense operators that appear in such sentences.

However, while Locator seems to work well for sentences such as (3), it causes serious problems when applied to certain other sentences. For example, we can define what it is for two things to be *instantmates* as follows:

INSTANTMATES:  $\forall x \forall y (x \text{ and } y \text{ are instantmates} =_{def} \exists z T z \wedge L(x, z) \wedge L(y, z))$

In short, for two things to be instantmates is for there to be some instant at which they are both located. Now, most B-theorists accept that some things are *not* instantmates, such as Napoleon and Queen Elizabeth II – i.e. that there are (quantifying unrestrictedly) *non-instantmates*:

NON-INSTANTMATES: There are non-instantmates

Moreover, most B-theorists accept the tense-logical rule that one can always validly infer ‘Sometimes,  $\varphi$ ’ from ‘ $\varphi$ ’, or informally, that whatever is the case is sometimes the case:

SOMETIMES INTRODUCTION:  $\varphi \supset S\varphi$ <sup>11</sup>

(*Informally: Whatever is the case is sometimes the case*)

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<sup>11</sup> Given the inter-definability of ‘S’ and ‘A’ ( $S\varphi =_{def} \neg A \neg \varphi$ ;  $A\varphi =_{def} \neg S \neg \varphi$ ), Sometimes Introduction is equivalent to the rule  $A\varphi \supset \varphi$ .

Sometimes Introduction is the temporal analogue of the widely accepted modal axiom  $T$ , according to which (informally) whatever is the case is metaphysically possible:

$$T: \varphi \supset \diamond\varphi^{12}$$

*(Informally: Whatever is the case is metaphysically possible)*

Non-instantmates and Sometimes Introduction jointly imply

(7) Sometimes, there are non-instantmates

But given Locator, (7) implies

(8) There is an instant  $t$  such that there are non-instantmates located at  $t$

which implies a contradiction given the above definition of ‘non-instantmate’.

Similarly, most B-theorists hold that there are (quantifying unrestrictedly) many instants of time. Call this thesis *Times*:

TIMES: There are many instants

Given Sometimes Introduction, Times implies

(9) Sometimes, there are many instants

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<sup>12</sup> Given the inter-definability of ‘ $\diamond$ ’ and ‘ $\square$ ’ ( $\diamond\varphi =_{def} \neg\square\neg\varphi$ ;  $\square\varphi =_{def} \neg\diamond\neg\varphi$ ),  $T$  is equivalent to the rule  $\square\varphi \supset \varphi$ .

And given Locator, (9) implies

(10) There is an instant  $t$  such that there are many instants located at  $t$

However, given that for any instants  $t$  and  $t^*$ ,  $t$  is located at  $t^*$  iff  $t = t^*$ , (10) implies a contradiction. In short, it appears that Locator is inconsistent with some other very natural B-theoretic commitments.

The problems for B-theorists arising from an acceptance of Locator and theses such as Non-instantmates and Times should be familiar to those acquainted with the ‘advanced modalizing’ debate concerning the correct interpretation of the modal operators ‘ $\diamond$ ’ (pronounced ‘it is metaphysically possible that’) and ‘ $\square$ ’ (pronounced ‘it is metaphysically necessary that’) given David Lewis’s (1986) *Modal Realism*.<sup>13</sup> For example, Modal Realists accept that there are (quantifying unrestrictedly) many possible worlds.<sup>14</sup>

WORLDS: There are many possible worlds

But they also accept the modal analogue of Locator – call it *M-Locator* – and therefore accept the following analyses of ‘ $\diamond$ ’ and ‘ $\square$ ’ (where ‘ $W$ ’ expresses the property of being a possible world and ‘ $[\varphi]^x$ ’ is read as equivalent to  $\varphi$  but with all quantifiers in  $\varphi$  restricted to the inhabitants of  $x$ ):

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<sup>13</sup> On this debate, see especially Divers (1999, 2002 §4.3, 2014), Dorr (*Counterparts* MS), Jago (2016), Marshall (2016), Noonan (2014), Parsons (2012), and Williamson (2013, 16-17).

<sup>14</sup> Lewis (1986) identifies possible worlds with maximal mereological sums of spatiotemporally interrelated individuals.

$$\diamond\varphi := \exists x(Wx \wedge [\varphi]^x)$$

*(Informally: For it to be the case that it is metaphysically possible that  $\varphi$  is for it to be the case that, restricting attention to things located in some possible world  $w$ ,  $\varphi$ )*

$$\Box\varphi := \forall x(Wx \supset [\varphi]^x)$$

*(Informally: For it to be the case that it is metaphysically necessary that  $\varphi$  is for it to be the case that, restricting attention to things located in any possible world  $w$ ,  $\varphi$ )*

Given T, Worlds implies:

(11) Possibly, there are many possible worlds

But given M-Locator, (11) implies:

(12) There is a possible world  $w$  such that there are many possible worlds located in  $w$

which implies a contradiction given that for any worlds  $w$  and  $w^*$ ,  $w$  is located in  $w^*$  iff  $w = w^*$ . In short, it seems that M-Locator is inconsistent with some other very natural Modal Realist commitments. (Consider also the sentence ‘There are things such that there is no possible world in which they are both located’).

We have seen that Locator causes serious problems for B-theorists when applied to sentences such as

(9) Sometimes, there are many instants

just as M-Locator causes serious problems for Modal Realists when applied to sentences such as

(11) Possibly, there are many possible worlds

These problems should come as no surprise. The standard B-theoretic analyses of the tense operators as expressed by Locator are designed to handle tense operators as they appear in the QTL-regimentations of ordinary tensed sentences such as

(2) There used to be dinosaurs

But they are not designed to handle tense operators as they appear in sentences such as (9) above, in which the operators are applied to the unrestrictedly quantified sentences which B-theorists use to express their particular view of temporal reality. Similarly, the standard Modal Realist analyses of the (metaphysical) modal operators as expressed by M-Locator are designed to handle the modal operators as they appear in the regimentations into Quantified Modal Logic (QML) of ordinary modal sentences such as

(13) There could be blue donkeys

But they are not designed to handle modal operators as they appear in sentences such as (11) above, in which the operators are applied to the unrestrictedly quantified sentences which Modal Realists use to express their particular view of modal reality.<sup>15</sup>

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<sup>15</sup> Why not simply replace ‘*T*’ in the Locator-theoretic analyses of the tense operators and ‘*W*’ in the M-Locator-theoretic analyses of the modal operators with ‘*T\**’ and ‘*W\**’ respectively, where ‘*T\**’ expresses the property of being a fusion of instants and ‘*W\**’ expresses the property of being a fusion of possible worlds? I consider this strategy in §4.2 below.



### 3. Redundancy

The question of how Modal Realists should address the problems generated by M-Locator has received far more attention than the analogous question of how B-theorists should address the problems generated by Locator.<sup>16</sup> In §4 below, I describe some well-known answers to the modal question due to Divers (1999, 2002), Bricker (2001), and Parsons (2012). However, the aim of this paper is to make progress on the temporal question, by defending a certain answer to that question. The answer is straightforward: B-theorists should reject Locator in favour of the view that the standard tense operators ‘P’ and ‘F’ are redundant when the sentences within their scope are *qualitative* – roughly, not about any particular individual (more on this below). Call this thesis *Redundancy*:<sup>17</sup>

REDUNDANCY: For any qualitative sentence  $\varphi$ ,  $P\varphi$  and  $F\varphi$  are equivalent to  $\varphi$

Given the standard definitions of the tense operators ‘S’ and ‘A’ in terms of ‘P’ and ‘F’ (see §1 above), Redundancy implies that for any qualitative sentence  $\varphi$ ,  $S\varphi$  and  $A\varphi$  are equivalent to  $\varphi$ .

Redundancy clearly provides B-theorists with a solution to the problems generated by Locator. For example, given that Non-instantmates is a qualitative sentence – i.e. it is not about any particular individual – it follows given Redundancy that the tense operator in the sentence

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<sup>16</sup> I am not aware of any published work that focuses primarily on the temporal question. Dorr (*Counterparts* MS) addresses the temporal question but prioritises the modal question, and Marshall (2016) mentions the temporal question but otherwise focuses on the modal question.

<sup>17</sup> Dorr (*Counterparts* MS) argues that B-theorists should accept Redundancy. However, note that Dorr’s defence of the thesis is distinct from that presented here.

(7) Sometimes, there are non-instantmates

is redundant, and therefore that (7) is equivalent to Non-instantmates. Similarly, given that Times is a qualitative sentence – i.e. it is not about any particular individual – it follows given Redundancy that the tense operator in the sentence

(9) Sometimes, there are many instants

is redundant, and therefore (9) is equivalent to Times.

Similarly, call the view that the standard modal operators ‘ $\diamond$ ’ and ‘ $\square$ ’ are redundant when the sentences within their scope are qualitative *M-Redundancy*:

M-REDUNDANCY: For any qualitative sentence  $\varphi$ ,  $\diamond\varphi$  and  $\square\varphi$  are equivalent to  $\varphi$ <sup>18</sup>

M-Redundancy clearly provides Modal Realists with a solution to the problems generated by M-Locator. For example, given that Worlds is a qualitative sentence – it is not about any particular individual – it follows given M-Redundancy that the modal operator in the sentence

(11) Possibly, there are many possible worlds

is redundant, and therefore that (11) is equivalent to Worlds.

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<sup>18</sup> Noonan (2014) argues that Modal Realists should accept M-Redundancy.

Returning to the temporal case, it is worth pausing to make a couple of points about Redundancy. First, Redundancy relies on the notion of a *qualitative sentence*, characterized above as a sentence that is not about any particular individual. But what is it for a sentence to be *about* a particular individual? Following Bacon (forthcoming, *Philosophical Studies*), let us say that a *qualitative proposition* is a proposition that is not about any particular individual, and a proposition that is not qualitative is *haecceistic*. For example, the proposition that Xanthippe was wise is a haecceistic proposition, as it is about the particular individual Xanthippe, but the proposition that someone was wise is a qualitative proposition, as it is not about any particular individual. Then we can say that a qualitative sentence is a sentence that expresses a qualitative proposition, and a haecceistic sentence is a sentence that expresses a haecceistic proposition.

However, some might not find this answer very satisfying, on the grounds that we have simply replaced the question of what it is for a *sentence* to be about a particular individual with the question of what it is for a *proposition* to be about some particular individual. As Bacon (ibid, 3) points out, given a metaphysics of propositions according to which propositions are structured entities with (monadic or polyadic) relations and particular individuals as literal constituents, we could say that a proposition  $p$  is about a particular individual  $a$  just in case  $p$  has  $a$  as a constituent, and is not about any particular individual – i.e. is qualitative – just in case  $p$  has no particular individuals as constituents. However, as Bacon also points out, some theorists prefer a more coarse-grained theory of propositions according to which, for example, the propositions  $p \vee q$  and  $\neg(\neg p \wedge \neg q)$  are identical. Such theorists may simply have to take the notion of a proposition's being *about* a particular individual as primitive, understanding it via examples such as the propositions that Xanthippe

was wise (which is about Xanthippe) and the proposition that someone was wise (which is not about any particular individual).<sup>19</sup>

An alternative approach is to try to avoid talk of ‘aboutness’ altogether, and instead characterise qualitative sentences in linguistic terms. For example, we might say that a qualitative sentence is a sentence that is free from ‘singular’ (or ‘directly referential’) terms like proper names, demonstratives, and free variables; or a sentence that is built entirely from quantifiers, logical connectives, and ‘non-singular’ predicates. But what exactly is a ‘singular term’, and what exactly is a ‘non-singular predicate’? Unless we are willing to use notions like *aboutness*, it may be that the best way to understand these notions is simply via examples: for example, ‘is a donkey’ is a non-singular predicate, but ‘is French’ is not, as it is equivalent to the predicate ‘is from France’, which contains the singular term ‘France’.

Second, Redundancy obviously tells us nothing about how B-theorists should interpret the standard tense operators when the sentences in their scope are haecceistic (i.e. express propositions about particular individuals). For example, consider the sentence:

(14) Obama used to be a lawyer

Typically, B-theorists hold that (14) reduces to something like (where ‘*a*’ names Obama):

(15)  $\exists x(Tx \wedge x < n \wedge \text{Lawyer}(a,x))$

*(Informally: Obama is a lawyer at some past instant)*

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<sup>19</sup> As Bacon (ibid, 3-4) points out, even if the notion of a proposition’s being *qualitative* is taken as primitive, ‘we can nonetheless connect it to other related concepts, thus widening the circle of analysis’.

However, this is not the end of the story: exactly what it is according to the B-theory for Obama to be a lawyer *at some past instant* will depend on which theory of persistence B-theorists accept.<sup>20</sup> Briefly, on an *Endurantist* account, (15) is made true by the fact that there is an instant  $t$  earlier than  $n$  such that Obama bears the permanent *lawyer-at* relation to  $t$ ; on a *Perdurantist* account, (15) is made true by the fact that there is an instant  $t$  earlier than  $n$  such that there is an instantaneous temporal part<sup>21</sup> of Obama which is a lawyer and is located at  $t$ ; and on a temporal counterpart-theoretic account, (15) is made true by the fact that there is an instant  $t$  earlier than  $n$  such that there is a temporal counterpart<sup>22</sup> of Obama which is a lawyer and which is located at  $t$ . Whichever theory is preferred, however, it remains the case that B-theorists typically interpret the tense operators in a haecceistic sentence like (14) as non-redundant.

Given as we have seen that Redundancy provides a relatively simple and elegant solution to the problems generated by Locator, it is natural to wonder why the view is not standardly accepted by B-theorists. A plausible reason is that Redundancy implies *Qualitative Permanentarianism*:

QUALITATIVE PERMANENTARIANISM: For any qualitative sentence  $\varphi$ ,  $\varphi \supset A\varphi$

But as we saw above, the B-theory is standardly taken to imply the truth of the sentence

(6)  $\exists x(Tx \wedge x < n \wedge \exists y(Dy \wedge L(y,x)))$

(*Informally: There are dinosaurs located at a past instant*)

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<sup>20</sup> See especially Haslanger & R. M. Kurtz (2006) for discussion of theories of persistence.

<sup>21</sup> Following Sider (2001, 59) we can say that some  $x$  is an *instantaneous temporal part* of some  $y$  at instant  $t$  iff (i)  $x$  is located at and only at  $t$ ; (ii)  $x$  is part of  $y$  at  $t$ ; and (iii)  $x$  overlaps at  $t$  everything that is part of  $y$  at  $t$ .

<sup>22</sup> A *temporal counterpart* of Obama is an instantaneous object that resembles Obama in relevant respects. See Hawley (2001) for a defence of temporal counterpart theory ('the stage view').

which implies

$$(16) \exists xDx^{23}$$

*(Informally: There are (quantifying unrestrictedly) dinosaurs)*

But given Qualitative Permanentarianism, (16) implies

$$(17) \mathbf{A} \exists xDx$$

*(Informally: It is always the case that there are dinosaurs)*

And – so the objection goes – (17) is implausible (or ‘counterintuitive’). For example, here is Marshall (2016, 11) on the analogous modal case (where ‘(3)’ refers to the sentence ‘ $\Box \exists xBx$ ’ – to be read ‘Necessarily, there are blue swans’ – and ‘QR modal realism’ refers to the conjunction of Modal Realism and M-Redundancy):

(3), however, is highly implausible, since, even if there are blue swans as modal realists claim, surely there might have been no such entities. The claim that it is necessary that there is a blue swan somewhere in the pluriverse of L-worlds (given there is in fact a blue swan in this pluriverse) is prima facie no more plausible than the claim that it is necessary that there is an alien creature somewhere in our universe (given there is in fact an alien creature somewhere in our universe). Even if there are alien creatures on some planet in our universe, it is surely merely contingent that there are such creatures. Similarly, even if there are blue swans in some L-world in the pluriverse, it is surely merely contingent that there are such swans. Hence, it is highly plausible that, contra QR modal realism, it is not necessary that there is a blue swan.

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<sup>23</sup> See e.g. Sider (2011, 241): ‘thus he [the B-theorist] accepts “There are dinosaurs”,  $\exists xDx$ ’.

Call the conjunction of the B-theory and Redundancy the *RB-theory*. An analogous objection to the RB-theory would run: ‘(17) is highly implausible, since, even if there are dinosaurs as B-theorists claim, surely there are sometimes no such entities. The claim that there are always dinosaurs somewhere in the spacetime manifold (given there is in fact a dinosaur in the manifold) is *prima facie* no more plausible than the claim that there are always alien creatures somewhere in our universe (given there is in fact an alien creature somewhere in our universe). Even if there are alien creatures on some planet in our universe, it is surely only sometimes the case that there are such creatures. Similarly, even if there are dinosaurs in some region of the manifold, it is surely only sometimes the case that there are dinosaurs.’ Call this objection to the RB-theory the *Implausibility Objection*.<sup>24</sup> A more general version of the objection is simply that the RB-theory implies that there is no *de dicto* change (i.e. change in qualitative states of affairs), and it is highly implausible that there is no *de dicto* change; therefore, we have a good reason to reject the RB-theory.

I think that RB-theorists can provide a convincing response to the Implausibility Objection. The first point to make is that judgements of plausibility typically depend on one’s antecedent theoretical commitments, and even simply on the sorts of views and theoretical considerations to which one is routinely exposed. For example, a person with little exposure to the B-theory might find (16) ( $\exists xDx$ ) utterly implausible – but sufficient time spent in the company of B-theorists might cause her to find the sentence quite plausible. Similarly, a B-theorist who is used to interpreting the tense operators in line with Locator will find the sentence

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<sup>24</sup> Jago (2016, 4) raises a similar objection to Divers’s (1999, 2002) proposed interpretation of the standard modal operators. See §4.1 below.

(18)  $S \neg \exists x D x$

(*Informally: Sometimes, there are no dinosaurs*)

highly plausible – but sufficient time spent in the company of RB-theorists might cause her to find the sentence implausible.<sup>25</sup>

Indeed, even in the absence of Redundancy, the truth of a sentence like (17) can be seen as plausible given the B-theory. In particular, there is a very natural sense in which, given the B-theory, *reality as a whole does not change*. But unrestricted quantification – the kind of quantification used in the sentence

(16)  $\exists x D x$

– is quantification over all of reality. Therefore, B-theorists should not expect there to be any change in the state of affairs expressed by (16). But if there is no change in the state of affairs expressed by (16) – and tense operators are a means of capturing change or its absence – then it is natural for B-theorists to accept that there are (quantifying unrestrictedly) *always* dinosaurs, and therefore that (17) is true.

The idea that (17) is true given the B-theory can be made even more plausible by focusing on some of the typical B-theoretic commitments that ‘fit’ very naturally with the truth of (17). For example, as we saw above in §1, the B-theory is typically taken to imply Propositional Eternalism, the view that every proposition is if true always true. But given

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<sup>25</sup> Note that the claim here is not that B-theorists who find the negation of (18) – i.e. (17) – implausible must be confusing that sentence with the false sentence ‘There are dinosaurs located at every instant’. One might clearly distinguish those sentences and still find (17) implausible. The claim is simply that sufficient exposure to the RB-theory can come to make (17) seem plausible.



Propositional Eternalism, it follows that the proposition that there are dinosaurs is always true. So, the B-theory implies:

(19) It is always a fact that there are dinosaurs<sup>26</sup>

But it seems strange (even if it is consistent) to hold that it is always a fact that there are dinosaurs, but it is not always the case that there are dinosaurs. Given the truth of (19), the truth of (17) seems quite natural. Similarly, as we saw above, the B-theory is typically taken to imply the truth of (16) (' $\exists xDx$ '). Given Propositional Eternalism, it follows that whenever anyone assertively utters (16), they express a truth. But it seems strange (even if it is consistent) to hold that whenever anyone assertively utters the sentence ' $\exists xDx$ ' they express a truth, but it is not always the case that there are dinosaurs. Given that whenever anyone assertively utters the sentence ' $\exists xDx$ ' they express a truth, the truth of (17) seems quite natural. Finally, even B-theorists who reject Redundancy typically accept that the standard tense operators are redundant when the sentences in their scope are qualitative but the individual quantifiers in their scope are already explicitly restricted to the inhabitants of some instant. For example, the B-theory is typically taken to imply:

(20)  $\Lambda \exists x(Tx \wedge \exists yDy \wedge L(y,x))$

*(Informally: Always, there are dinosaurs located at some instant)*

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<sup>26</sup> 'Fact' here just means 'true proposition'.

But it seems strange (even if it is consistent) to hold that it is always the case there are dinosaurs located at some instant, but it is not always the case that there are dinosaurs. Given the truth of (20), the truth of (17) seems quite natural.

A second response that RB-theorists can make to the Implausibility Objection is to point out that while they are committed to the truth of (17), they are *not* thereby committed to the claim that anyone who assertively utters the sentence

(21) There used to be dinosaurs, but there are none now

expresses a contradiction – they can still make good sense of ordinary tensed talk. In particular, the reading of (21) on which it expresses a contradiction given Redundancy is one on which the quantifiers are read as *unrestricted*. However, it is commonplace that much quantification in ordinary thought and speech is implicitly restricted. For example, RB-theorists can interpret the quantifiers in an ordinary assertive utterance of (21) as implicitly restricted to the inhabitants of this planet, so that the sentence is read as having the form (where ‘*e*’ refers to this planet and ‘*Hx*’ means ‘*x* is inhabited by dinosaurs’):

(22)  $PHe \wedge \neg He$

(*Informally: This planet was inhabited by dinosaurs, but now it isn't*)

Given the RB-theory, the tense operator ‘P’ in the left-hand conjunct of (22) can be interpreted as non-redundant, as the sentence in its scope (‘*He*’) is haecceistic – it expresses a proposition about Earth. Similarly, consider the sentence

(23) Dinosaurs don't always exist

RB-theorists are not committed to the claim that anyone who assertively utters (23) expresses a falsehood. For example, RB-theorists can interpret the quantifier in an ordinary assertive utterance of (23) as restricted to the inhabitants of this planet (as in (22)), so that the sentence expresses the true proposition that Earth isn't always inhabited by dinosaurs:

(24)  $\neg AHe$

*(Informally: Earth isn't always inhabited by dinosaurs)*

The general lesson here is that RB-theorists are not significantly worse off than B-theorists who accept Locator when it comes to making sense of ordinary tensed talk – all they require is the commonplace idea that quantification in ordinary thought and speech is often implicitly restricted. After all, even B-theorists who accept Locator need to account for the truth of ordinary utterances of sentences like

(25) Dinosaurs don't exist

given that they accept the truth of (16). They typically do this by interpreting the quantifier in an ordinary assertive utterance of (25) as restricted to things located at the present instant  $n$ , so that (25) expresses the true proposition that there are no dinosaurs located at  $n$ .

Finally, RB-theorists can draw attention to the fact that, like B-theorists who accept Locator, they accept Anti-temporalism, the thesis that the tense operators are metaphysically non-fundamental. Therefore, although RB-theorists hold that sentences (16) (' $\exists xDx$ ') and (17) (' $A \exists xDx$ ') are logically equivalent, like B-theorists who accept Locator, they deny that (16) and (17) provide equally 'metaphysically perspicuous' ways of expressing the relevant

state of affairs. More generally, the question of whether B-theorists should accept Redundancy is *not* a question concerning the truth of some sentence of the B-theorist's fundamental, tense operator-free language. RB-theorists are in complete agreement with B-theorists who accept Locator concerning the fundamental facts.<sup>27</sup> Among other things, this means that when it comes to describing *fundamental* temporal reality, RB-theorists have exactly the same expressive resources as B-theorists who accept Locator. For example, while the sentence

$$(18) S \neg \exists x D x$$

*(Informally: Sometimes, there are no dinosaurs)*

is false given the RB-theory, the following sentence is, of course, true:

$$(26) \exists x (T x \wedge \neg \exists y D y \wedge L(y, x))$$

*(Informally: There is an instant at which there are no dinosaurs)*

In this case, the only relevant implication for B-theorists of accepting Redundancy is that (18) is not equivalent to (26). But the non-equivalence of these sentences given Redundancy would hardly be a good reason for rejecting the view, given that it provides a simple and elegant solution to the problems generated by Locator.

I have described what I take to be a convincing B-theoretic response (or rather, set of responses) to the Implausibility Objection. (Modal Realists can make analogous responses to the analogous objection.) I hope that this has strengthened the case for a B-theoretic

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<sup>27</sup> This in no way implies that the dispute is not *important*. For example, if RB-theorists denied that e.g. what is the case always will have been the case ( $\varphi \supset GP\varphi$ ), that would be a good reason for rejecting the view.

acceptance of Redundancy as a solution to the problems generated by Locator. But there is more to be said, because accepting Redundancy is not the only way for B-theorists to avoid the problems generated by Locator. In the next section, I assess some potentially attractive alternative strategies available to B-theorists. In the end, I conclude that the best strategy available to B-theorists for dealing with the problems generated by Locator is to reject Locator in favour of Redundancy.

#### *4. Alternatives*

In this section I consider four alternative strategies available to B-theorists for avoiding the problems generated by Locator. The first three, like the strategy defended in §3 above, involve the rejection/modification of Locator. They are: endorsing the temporal analogue of Divers's (1999, 2002) analyses of the modal operators (§4.1); endorsing the temporal analogue of Bricker's (2001) analyses of the modal operators (§4.2); and endorsing the temporal analogue of Parsons's (2012) analyses of the modal operators (§4.3). The fourth strategy involves rejecting Sometimes Introduction (§4.4). In each case, I argue that there are good reasons for B-theorists to prefer the strategy of rejecting Locator in favour of Redundancy.

##### 4.1 Divers's Strategy

As Divers (1999, 228, fn.9; 2002, 47, fn.14) points out, David Lewis (1986) seems to have been aware of the potential for the interpretation of the modal operators as quantifier-restrictors (i.e. for an acceptance of M-Locator) to generate problems for Modal Realism. In particular, Lewis writes (1986, 6):

Two qualifications concerning our restrictive modifiers. (1) I do not suppose that they must restrict all quantifiers in their scope, without exception... 'At some small worlds, there is a natural number too big to measure any class of individuals' can be true even if the large number that makes it true is no part of the small world.

Lewis's point seems to be that Modal Realists should allow that for certain sentences, the modal operator 'At possible world  $w$ ' does not have the expected world-restricting effect on the quantifiers in its scope. Similarly, it is natural to think that the modal operator in the sentence

(11) Possibly, there are many possible worlds<sup>28</sup>

does not have the expected world-restricting effect on the quantifiers in its scope, so that (11) is equivalent to Worlds; and similarly for the sentence

(27) Necessarily, there are many possible worlds

The question is, for *which* sentences should Modal Realists hold that the modal operators fail to restrict the quantifiers in their scope (and are therefore redundant)? Divers (1999, 2002) argues that Modal Realists should hold that the standard modal operators '◇' and '□' are redundant when the sentences within their scope are 'extraordinary', where an *extraordinary sentence* is one whose subject matter is things not all of which are located in a single possible world. As Divers (2002, 50) puts it:

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<sup>28</sup> (11) is an example of what Divers (1999, 219) calls 'advanced modalizing'.

GR [Modal Realism] appeals to the extraordinary interpretation of modal claims [i.e. treats the standard modal operators as redundant] whenever she [the Modal Realist] intends or interprets the non-modal content as content that is not world-restricted content.

In other words, Divers argues that Modal Realists should accept the following analyses of the standard modal operators (where an *ordinary sentence* is a sentence that is not extraordinary):<sup>29</sup>

$$\diamond\varphi := (\varphi \text{ is ordinary} \wedge \exists x(Wx \wedge [\varphi]^x)) \vee (\varphi \text{ is extraordinary} \wedge \varphi)$$

*(Informally: For it to be the case that it is metaphysically possible that  $\varphi$  is for it to be the case that either  $\varphi$  is an ordinary sentence and restricting attention to things located in some possible world  $w$ ,  $\varphi$ , or  $\varphi$  is an extraordinary sentence and  $\varphi$ )*

$$\Box\varphi := (\varphi \text{ is ordinary} \wedge \forall x(Wx \supset [\varphi]^x)) \vee (\varphi \text{ is extraordinary} \wedge \varphi)$$

*(Informally: For it to be the case that it is metaphysically necessary that  $\varphi$  is for it to be the case that either  $\varphi$  is an ordinary sentence and restricting attention to things located in any possible world  $w$ ,  $\varphi$ , or  $\varphi$  is an extraordinary sentence and  $\varphi$ )*

It is easy to see that Divers's analyses provide Modal Realists with a way of avoiding the problems generated by M-Locator described in §2 above: for example, given that Worlds is

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<sup>29</sup> Note that Divers (2014) rejects the reading of Divers (2002) according to which the argument there is that Modal Realists should treat the standard modal operators as redundant when applied to a certain kind of sentence, in favour of a reading according to which the argument is that Modal Realists should treat the operators as redundant *in cases where it is charitable to Modal Realism to do so* (see especially Divers 2014, 868). Marshall (2016, 17ff) interprets the latter strategy as implying that 'possibly' and 'necessarily' are ambiguous, and objects to the strategy on those grounds.

an extraordinary sentence, it follows given Divers's analyses that (11) and (27) above are both equivalent to Worlds.

For that reason, B-theorists might be tempted to respond to the problems for their view generated by Locator by rejecting Locator in favour of the following Divers-inspired analyses of the standard tense operators (where a *temporally extraordinary sentence* is one whose subject matter is things such that there is no instant at which they are all located – i.e. *non-instantmates* in the sense of §2 above – and a *temporally ordinary sentence* is a sentence that is not temporally extraordinary):

$$P\varphi := (\varphi \text{ is temporally ordinary} \wedge \exists x(Tx \wedge x < n \wedge [\varphi]^x)) \vee (\varphi \text{ is temporally extraordinary} \wedge \varphi)$$

*(Informally: For it to be the case that it was that  $\varphi$  is for it to be the case that either  $\varphi$  is a temporally ordinary sentence and restricting attention to things located at some past instant  $t$ ,  $\varphi$ , or  $\varphi$  is a temporally extraordinary sentence and  $\varphi$ )*

$$F\varphi := (\varphi \text{ is temporally ordinary} \wedge \exists x(Tx \wedge n < x \wedge [\varphi]^x)) \vee (\varphi \text{ is temporally extraordinary} \wedge \varphi)$$

*(Informally: For it to be the case that it will be that  $\varphi$  is for it to be the case that either  $\varphi$  is a temporally ordinary sentence and restricting attention to things located at some future instant  $t$ ,  $\varphi$ , or  $\varphi$  is a temporally extraordinary sentence and  $\varphi$ )*

Given the standard definitions of the tense operators 'S' and 'A' in terms of 'P' and 'F' (see §1 above), these analyses imply:



$S\varphi := (\varphi \text{ is temporally ordinary} \wedge \exists x(Tx \wedge [\varphi]^x)) \vee (\varphi \text{ is temporally extraordinary} \wedge \varphi)$

*(Informally: For it to be the case that sometimes,  $\varphi$  is for it to be the case that either  $\varphi$  is a temporally ordinary sentence and restricting attention to things located at some instant  $t$ ,  $\varphi$ , or  $\varphi$  is a temporally extraordinary sentence and  $\varphi$ )*

$A\varphi := (\varphi \text{ is temporally ordinary} \wedge \forall x(Tx \supset [\varphi]^x)) \vee (\varphi \text{ is temporally extraordinary} \wedge \varphi)$

*(Informally: For it to be the case that always,  $\varphi$  is for it to be the case that either  $\varphi$  is a temporally ordinary sentence and restricting attention to things located at any instant  $t$ ,  $\varphi$ , or  $\varphi$  is a temporally extraordinary sentence and  $\varphi$ )*

Call these the *Extraordinary Analyses* of the standard tense operators. It is clear that the Extraordinary Analyses avoid the problems for B-theorists generated by Locator. For example, given that Times is a temporally extraordinary sentence – its subject matter is things such that there is no instant at which they are all located – it follows given the Extraordinary Analyses that the sentence

(9) Sometimes, there are many instants

is equivalent to Times.

Both the Extraordinary Analyses and Redundancy provide similar strategies for avoiding the problems for B-theorists generated by an acceptance of Locator. The key difference concerns the kind of sentences for which the standard tense operators are treated as redundant: temporally extraordinary sentences in the case of the Extraordinary Analyses, and

qualitative sentences in the case of Redundancy. Moreover, both strategies face the Implausibility Objection: in particular, given that according to the B-theory there is no instant at which all dinosaurs are located, the sentence

$$(16) \exists xDx$$

is a temporally extraordinary sentence, and therefore given the Extraordinary Analyses implies

$$(17) A \exists xDx$$

The question, then, is whether there is any good reason for B-theorists to prefer Redundancy to the Extraordinary Analyses. In fact, there is: given certain standard tense-logical principles, the interpretation of the standard tense operators as redundant when applied to temporally extraordinary sentences gives rise to serious problems for B-theorists.

To see this, let us first shift to the modal case, and consider the following pair of sentences (where ‘*a*’ names me; ‘*S*’ expresses the property of being a sibling; ‘*R*’ expresses the relation of being located in the same possible world; and ‘*b*’ names some particular located in a possible world other than this one):<sup>30</sup>

$$(28) \diamond \neg Sa$$

*(Informally: I could have failed to be a sibling)*

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<sup>30</sup> This objection is due to Marshall (2016, 17, fn.43).

(29)  $\Box(Sa \wedge \neg Rab)$

*(Informally: Necessarily, I am a sibling and it's not the case that I am located in the same possible world as b)*

Given the standard modal principles that (i) if  $\Box(\varphi \wedge \psi)$  then  $\Box\varphi$  and (ii) if  $\Box\varphi$  then  $\neg\Diamond\neg\varphi$ , (28) and (29) are inconsistent. However, notice that the sentence

(30)  $Sa \wedge \neg Rab$

is an extraordinary sentence in Divers's sense: it is a sentence whose subject matter is things not all of which are located in a single possible world. It follows that on Divers's analyses of the standard modal operators, the modal operator in (29) is redundant, and therefore (29) is equivalent to (30). And given that (30) is true given Modal Realism – it is true that I am a sibling and it's not the case that I am located in the same possible world as  $b$  – it follows that on Divers's analyses of the standard modal operators, (29) is true given Modal Realism. But as (28) is also true given Modal Realism, it follows that on Divers's analyses of the standard modal operators, given Modal Realism (28) and (29) are both true. However, as we saw above, (28) and (29) are inconsistent. This is clearly a very bad result for Divers's analyses.<sup>31</sup>

Now let us return to the temporal case. Consider the following pair of sentences (where ' $a$ ' names me; ' $S$ ' expresses the property of being a sibling; ' $R^*$ ' expresses the relation of being an instantmate; and ' $b^*$ ' names some non-instantmate of mine, e.g. Xanthippe):

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<sup>31</sup> See Divers & J. Parry (2017) for a possible response to this sort of objection.

(31)  $S\neg Sa$

*(Informally: Sometimes, I am not a sibling)*

(32)  $A(Sa \wedge \neg R^*ab^*)$

*(Informally: Always, I am a sibling and there is no instant at which  $b$  and I are co-located)*

Given the standard tense-logical principles that (i) if  $A(\varphi \wedge \psi)$  then  $A\varphi$  and (ii) if  $A\varphi$  then  $\neg S\neg\varphi$ , (31) and (32) are inconsistent. However, notice that the sentence

(33)  $Sa \wedge \neg R^*ab^*$

is temporally extraordinary: it is a sentence whose subject matter is things such that there is no instant at which they are all located. It follows that on the Extraordinary Analyses, the tense operator in (32) is redundant, and therefore (32) is equivalent to (33). And given that (33) is true given the B-theory – it is true that I am a sibling and there is no instant at which  $b$  and I are co-located – it follows that on the Extraordinary Analyses, (32) is true given the B-theory. But as (31) is also true given the B-theory, it follows that on the Extraordinary Analyses, given the B-theory (31) and (32) are both true. However, as we saw above, (31) and (32) are inconsistent. This is clearly a very bad result for the Extraordinary Analyses. Moreover, note that B-theorists who accept Redundancy do not face this problem, as (33) is not a qualitative sentence – it expresses a proposition about particular individuals (me and  $b$ ) – and therefore it does not follow given Redundancy that (32) is equivalent to (33), and therefore that (32) is true. It follows that B-theorists who accept Redundancy can defend an interpretation of (32) on which it is false, for example, by accepting a temporal-counterpart

theoretic account of persistence and arguing that (32) implies the false claim that all of my temporal counterparts are siblings.<sup>32</sup>

#### 4.2 Bricker's Strategy

As Lewis (1986, 71) points out, Modal Realism implies that 'island universes' – universes with spatiotemporally disconnected parts – are metaphysically impossible. The reason is straightforward: given M-Locator, the sentence (where ' $Ux$ ' means ' $x$  is an island universe')

$$(34) \diamond \exists x Ux$$

*(Informally: Possibly, there is an island universe)*

is equivalent to

$$(35) \exists x (Wx \wedge \exists y Uy \wedge L(y,x))$$

*(Informally: There is an island universe located in some possible world)*

But given the Modal Realist thesis that possible worlds are maximal mereological sums of spatiotemporally connected individuals, (35) implies a contradiction. Bricker (2001) argues that Modal Realists can account for the possibility of island universes by rejecting M-Locator in favour of the following analyses of the modal operators (where ' $Fx$ ' means ' $x$  is a fusion of possible worlds'):

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<sup>32</sup> See Hawley (2001) for a defence of a version of temporal counterpart theory ('stage theory'). See also Lewis (1968, 1971) on modal counterpart theory.

$$\diamond\varphi := \exists x(Fx \wedge [\varphi]^x)$$

*(Informally: For it to be the case that it is metaphysically possible that  $\varphi$  is for it to be the case that, restricting attention to things located in some fusion of possible worlds  $f$ ,  $\varphi$ )*

$$\Box\varphi := \forall x(Fx \supset [\varphi]^x)$$

*(Informally: For it to be the case that it is metaphysically necessary that  $\varphi$  is for it to be the case that, restricting attention to things located in any fusion of possible worlds  $f$ ,  $\varphi$ )*

Given Bricker's analyses, (34) is not equivalent to (35) but to the true sentence

$$(36) \exists x(Fx \wedge \exists y Uy \wedge L(y,x))$$

*(Informally: There is an island universe located in some fusion of possible worlds)*

Moreover, Bricker's analyses provide Modal Realists with a way of avoiding the problems generated by M-Locator described in §2: for example, given Bricker's analysis of ' $\diamond$ ', the sentence

(11) Possibly, there are many possible worlds

is equivalent to the true sentence

(37) There are many possible worlds located at some fusion of possible worlds

For that reason, B-theorists might be tempted to respond to the problems for their view generated by Locator by rejecting Locator in favour of the following Bricker-inspired analyses of the standard tense operators (where ‘ $Ix$ ’ means ‘ $x$  is an interval of time’):

$$P\varphi := \exists x(Ix \wedge x < n \wedge [\varphi]^x)$$

*(Informally: For it to be the case that it was that  $\varphi$  is for it to be the case that, restricting attention to things located at some past interval  $i$ ,  $\varphi$ )*

$$F\varphi := \exists x(Ix \wedge n < x \wedge [\varphi]^x)$$

*(Informally: For it to be the case that it will be that  $\varphi$  is for it to be the case that, restricting attention to things located at some future interval  $i$ ,  $\varphi$ )*

Given the standard definitions of the tense operators ‘S’ and ‘A’ in terms of ‘P’ and ‘F’ (see §1 above), these analyses imply:

$$S\varphi := \exists x(Ix \wedge [\varphi]^x)$$

*(Informally: For it to be the case that sometimes,  $\varphi$  is for it to be the case that, restricting attention to things located at some interval  $i$ ,  $\varphi$ )*

$$A\varphi := \forall x(Ix \supset [\varphi]^x)$$

*(Informally: For it to be the case that always,  $\varphi$  is for it to be the case that, restricting attention to things located at any interval  $i$ ,  $\varphi$ )*

Call these the *Interval Analyses* of the standard tense operators. It is clear that the Interval Analyses avoid the problems for B-theorists generated by Locator – for example, given the Interval Analyses, the sentence

(9) Sometimes, there are many instants

is equivalent to the true sentence

(38) There are many instants located at some interval of time

Moreover, the Interval Analyses avoid the Implausibility Objection: given the Interval Analyses, the sentence

(17)  $\forall x \exists x D x$

is equivalent to the false sentence

(39)  $\forall x (I x \supset \exists y D y \wedge L(y, x))$

*(Informally: There are dinosaurs located at every interval of time)*

(I do not think this is really an advantage of the Interval Analyses, as I think that the truth of (17) is in fact *plausible* given the B-theory, for the reasons described in §3 above. However, judgements of plausibility vary, and I am aware that many will judge the truth of (17) to be implausible given the B-theory. So, let us count the falsehood of (17) given the Interval Analyses as an advantage of that strategy.)



We have seen that the Interval Analyses provide B-theorists with a solution to the problems generated by Locator that also avoids the Implausibility Objection. It might seem, therefore, that B-theorists should prefer the Interval Analyses to Redundancy. However, B-theorists who endorse the Interval Analyses face the temporal analogue of a well-known problem faced by Modal Realists who endorse Bricker's analyses of the standard modal operators.<sup>33</sup>

The problem arises from the fact that on the standard B-theoretic account, a sentence  $\varphi$  is *true simpliciter* just in case  $\varphi$  is true relative to the instant of utterance  $t$  of  $\varphi$ . So, for example, according to the standard B-theoretic account, an ordinary (restricted) utterance at the present instant  $n$  of the sentence

(25) Dinosaurs don't exist

is true simpliciter, as it is true that there are no dinosaurs located at  $n$ . However, given the Interval Analyses, there is pressure on B-theorists to revise the standard account of truth simpliciter for sentences. In particular, here is Bricker (2001, §3.3) on the modal case:

Suppose I assert: "Island universes exist." On the semantical framework that underlies the Amended Analysis [i.e. Bricker's analyses of the standard modal operators], the truth or falsity of my utterance is to be evaluated relative to a class of worlds. But which class? The world at which my utterance occurs belongs to many classes of worlds, and without absolute actualization there is nothing to choose between them. I consider three options. (1) Stay as close as possible to the old method according to which the truth or falsity of an utterance is evaluated relative to the world at which the utterance occurs. On the new semantical framework, this becomes: my utterance, "island universes exist," is true, simpliciter, if and only if it is true at the singleton whose sole member is the world at which my

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<sup>33</sup> See Bricker (2001), Jago (2016, §7), and Divers (2002, 103-105) for relevant discussion.

utterance occurs; otherwise, false, simpliciter. But, then, on semantical grounds alone, my utterance is false, simpliciter, since it is false at any singleton world. So, if we combine the Amended Analysis with option (1), we have it that my utterance is both contingently possible and analytically false. Not a happy combination.

An analogous problem arises for B-theorists who accept both the Interval Analyses and the standard account of truth simpliciter for sentences. For example, consider the sentence ‘There is an extended interval of time’: given the standard account of truth simpliciter for sentences, a current utterance of this sentence is false on semantic grounds alone; but given the Interval Analyses, it is true that sometimes, there is an extended interval of time.

The natural way for B-theorists who endorse the Interval Analyses to avoid this problem is to revise the standard B-theoretic account of truth simpliciter for sentences, so that a sentence  $\varphi$  is true simpliciter just in case  $\varphi$  is true relative to some interval  $i$  that contains the instant of utterance of  $\varphi$ . However, this leads to bad results. For example, consider sentence (25) above. If a sentence  $\varphi$  is true simpliciter just in case  $\varphi$  is true relative to *some* interval  $i$  that contains the instant of utterance of  $\varphi$ , then an ordinary (restricted) utterance of (25) at the present instant  $n$  is both true simpliciter and false simpliciter, as there is an interval  $i$  that contains  $n$  and contains dinosaurs, and another interval  $i^*$  (distinct from  $i$ ) that contains  $n$  but does not contain dinosaurs. One way to avoid this result would be to further revise the definition of truth simpliciter for sentences, so that a sentence  $\varphi$  is true simpliciter just in case  $\varphi$  is true relative to *every* interval  $i$  that contains the instant of utterance of  $\varphi$ . But then an ordinary (restricted) utterance of (25) at the present instant  $n$  is false simpliciter, as it is false that every interval  $i$  that contains  $n$  contains dinosaurs. However, this is clearly a bad result, as we would expect an ordinary (restricted) utterance of (25) at the present instant  $n$  to be *true*.

Bricker’s solution to the modal analogue of the above problem is to combine his ‘island-universe-friendly’ analysis of the standard modal operators with the thesis that some possible world or fusion of possible worlds possesses the primitive property of *actuality*. An analogous B-theoretic solution would be to combine the Interval Analyses with the thesis that some interval – plausibly, some instant – possesses the primitive property of *presentness*. But in that case, there would be something metaphysically special about the present instant in virtue of which it is present, and therefore Temporal Parity would be false. And given as we saw above in §1 that Temporal Parity is an essential B-theoretic thesis, that would be equivalent to rejecting the B-theory. Hence, B-theorists cannot accept this solution to the problem generated by the Interval Analyses.

#### 4.3 Parsons’s Strategy

Parsons (2012) argues that Modal Realists should respond to the problems generated by M-Locator by rejecting M-Locator in favour of the following ‘T-preserving Analyses’ of the modal operators:

$$\Diamond\varphi := \exists x(Wx \wedge [\varphi]^x) \vee \varphi$$

*(Informally: For it to be the case that it is metaphysically possible that  $\varphi$  is for it to be the case that restricting attention to things located in some possible world  $w$ ,  $\varphi$ , or  $\varphi$ )*

$$\Box\varphi := \forall x(Wx \supset [\varphi]^x) \wedge \varphi$$

*(Informally: For it to be the case that it is metaphysically necessary that  $\varphi$  is for it to be the case that restricting attention to things located in any possible world  $w$ ,  $\varphi$ , and  $\varphi$ )*

It is easy to see that Parsons's analyses provide Modal Realists with a way of avoiding the problems generated by M-Locator described in §2 above: for example, given the above analysis of '◇', the sentence

(11) Possibly, there are many possible worlds

is equivalent to Worlds. For that reason, B-theorists might be tempted to respond to the problems for their view generated by Locator by rejecting Locator in favour of the following Parsons-inspired analyses of the standard tense operators:

$$P\varphi := \exists x(Tx \wedge x < n \wedge [\varphi]^x) \vee \varphi$$

*(Informally: For it to be the case that it was that  $\varphi$  is for it to be the case that restricting attention to things located at some past instant  $t$ ,  $\varphi$ , or  $\varphi$ )*

$$F\varphi := \exists x(Tx \wedge n < x \wedge [\varphi]^x) \vee \varphi$$

*(Informally: For it to be the case that it will be that  $\varphi$  is for it to be the case that restricting attention to things located at some future instant  $t$ ,  $\varphi$ , or  $\varphi$ )*

Given the standard definitions of the tense operators 'S' and 'A' in terms of 'P' and 'F' (see §1 above), these analyses imply:

$$S\varphi := \exists x(Tx \wedge [\varphi]^x) \vee \varphi$$

*(Informally: For it to be the case that sometimes,  $\varphi$  is for it to be the case that restricting attention to things located at some instant  $t$ ,  $\varphi$ , or  $\varphi$ )*

$$A\varphi := \forall x(Tx \supset [\varphi]^x) \wedge \varphi$$

(Informally: For it to be the case that always,  $\varphi$  is for it to be the case that restricting attention to things located at any instant  $t$ ,  $\varphi$ , and  $\varphi$ )

Call these the *Parsons Analyses* of the standard tense operators. It is clear that the Parsons Analyses avoid the problems for B-theorists generated by Locator – for example, given the Parsons Analyses, the sentence

(9) Sometimes, there are many instants

is equivalent to Times. Moreover, the Parsons Analyses avoid the Implausibility Objection: given the Parsons Analyses, the sentence

(17)  $A \exists x Dx$

is equivalent to the false sentence

(40)  $\forall x(Tx \supset \exists y(Dy \wedge L(y,x)) \wedge \exists x Dx$

(Informally: *There are dinosaurs located at every instant and there are dinosaurs*)

(As above, I do not think the falsehood of (17) is *really* an advantage of the Parsons Analyses, but for dialectical purposes I allow that it is.)

We have seen that the Parsons Analyses provide B-theorists with a solution to the problems generated by Locator that also avoids the Implausibility Objection. It might seem,

therefore, that B-theorists should prefer the Parsons Analyses to Redundancy. However, there is a good reason for B-theorists to reject the Parsons Analyses:<sup>34</sup> given the Parsons Analyses, the following sentences are both true:

(9) Sometimes, there are many instants

(41) Sometimes, there is exactly one instant

Thus the Parsons Analyses deliver the unwelcome result that given the B-theory, the number of instants varies over time. Moreover, the analyses imply that it is never the case that there are exactly  $n$  instants for any  $n$  greater than 1. (For example, that there are exactly two instants is neither true simpliciter nor true when attention is restricted to things located at some instant  $t$ .) So given the Parsons Analyses, although the number of instants varies over time, the number of instants is never precise (except when it is 1). Something has clearly gone wrong. In contrast, given Redundancy it is always the case given the B-theory that there are many instants, and never the case that there is exactly one instant (or exactly two instants, or exactly three instants, and so on).

#### 4.4 Sometimes Introduction

So far we have focused on B-theoretic strategies for avoiding the problems generated by Locator which, like the strategy of accepting Redundancy, involve the rejection/modification

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<sup>34</sup> Dorr (*Counterparts* MS) describes a similar argument against the modal analogue of the Parsons Analyses. For a distinct argument against the Parsons Analyses, see Jago (2016, §4).

of Locator. We now turn to consider an alternative strategy: to retain Locator, and instead reject Sometimes Introduction:<sup>35</sup>

SOMETIMES INTRODUCTION:  $\varphi \supset S\varphi$

*(Informally: Whatever is the case is sometimes the case)*

As mentioned in §2, Sometimes Introduction is the temporal analogue of the widely-accepted modal axiom T ( $\varphi \supset \diamond\varphi$ ).<sup>36</sup> However, Sometimes Introduction might strike some as less obviously true than T. In particular, some might be tempted to reject Sometimes Introduction on the grounds that there is a class of ‘atemporal’ (or ‘timeless’) truths such that, for any atemporal truth p, the proposition that sometimes p is false.<sup>37</sup> Natural candidates for such truths are mathematical and logical truths, as well as truths that in some sense ‘concern the whole of temporal reality’, such as the true (from a B-theoretic perspective) proposition that there are many instants of time. A B-theorist could try to avoid the problems generated by Locator by arguing that the sentences which lead to contradiction given Sometimes Introduction and Locator (such as Times and Non-instantmates) are sentences which express

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<sup>35</sup> Note that Locator and Sometimes Introduction are independent theses: Sometimes Introduction tells us that whenever we have a sentence  $\varphi$  we can validly infer  $S\varphi$ ; Locator tells us that we should understand the tense operators (including ‘S’) as quantifiers over instants which restrict the individual quantifiers in their scope to things located at the relevant instants. Neither thesis implies the other. For example, both Bricker (2001) and Parsons (2012) accept T ( $\varphi \supset \diamond\varphi$ ), the modal analogue of Sometimes Introduction, even though both reject M-Locator. (Indeed, Parsons describes T as an ‘obviously valid pattern of inference’ and names his analysis of ‘ $\diamond$ ’ the ‘T-preserving analysis’). Similarly, it is not inconsistent to accept Locator and reject Sometimes Introduction: in that case, one holds that one cannot always validly infer  $S\varphi$  from  $\varphi$  and that  $S\varphi$  should be understood as equivalent to ‘Restricting attention to thing located at some instant  $t$ ,  $\varphi$ ’. Finally, it is of course possible for B-theorists to try to avoid the problems generated by Locator by rejecting both Locator *and* Sometimes Introduction – but such a strategy has no obvious advantages over the strategies contemplated here of rejecting one or other of the theses.

<sup>36</sup> Some theorists have contemplated the falsehood of T. For example, Halbach, Leitgeb and Welch (2003) argue that those who prefer an interpretation of modal notions as predicates should reject T, and Noonan (1994) recommends that modal realists reject T in order to avoid the problems generated by M-Locator.

<sup>37</sup> Some might try to co-opt Fine’s (2005) distinction between ‘inner’ and ‘outer’ truth in defence of this distinction. See Williamson (2002) for powerful arguments against this approach.

atemporal truths in the above sense, and are therefore counterexamples to Sometimes Introduction. Call a B-theorist who defends this strategy an *Atemporalist B-theorist*.

An immediate problem with the above strategy is that given that what is not sometimes the case is never the case (formally:  $\neg S\varphi \supset \forall \varphi$ ), it follows that for any atemporal truth  $p$ ,  $p$  implies never  $p$ .<sup>38</sup> But is very hard to accept that something is the case and yet never the case – that what is never the case is not the case will strike many as a tense-logical truth. For example, if the Atemporalist B-theorist argues that Times (‘There are many instants’) expresses an atemporal truth, then her view implies

(42) There are many instants and there are never many instants

But that seems strange: if it is never the case that there are many instants, then (surely) it is not the case that there are many instants.

A natural way for the Atemporalist B-theorist to respond to the above objection is to argue that on her view, Locator is true, and therefore on her view, tense operators such as ‘S’, ‘A’ and ‘V’ are to be understood as implicit quantifiers over instants which restrict the quantifiers in their scope to the relevant instants:

$$S\varphi := \exists x(Tx \wedge [\varphi]^x)$$

(Informally: For it to be the case that sometimes,  $\varphi$  is for it to be the case that, restricting attention to things located at some instant  $t$ ,  $\varphi$ )

$$A\varphi := \forall x(Tx \supset [\varphi]^x)$$

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<sup>38</sup> In the absence of any convention of which I am aware, I use ‘V’ to represent the tense operator ‘it is never the case that’. More generally,  $V\varphi$  is equivalent to  $\neg S\varphi$ . Given the inter-definability of ‘S’ and ‘A’,  $V\varphi$  is also equivalent to  $A\neg\varphi$ .



(Informally: For it to be the case that always,  $\varphi$  is for it to be the case that, restricting attention to things located at any instant  $t$ ,  $\varphi$ )

$$\forall\varphi := \neg \exists x(Tx \wedge [\varphi]^x)$$

(Informally: For it to be the case that never,  $\varphi$  is for it to be the case that there is no instant  $t$  such that restricting attention to things located at  $t$ ,  $\varphi$ )

In that case, on her view (42) above is equivalent to:

(43) There are many instants and there is no instant  $t$  such that there are many instants located at  $t$

And all B-theorists (including RB-theorists) accept the truth of (43). More generally, the Atemporalist B-theorist can argue that the above objection from the truth on her view of sentences like (42) fails to take into account what those sentences *really mean* in the mouth of a B-theorist who accepts Locator.<sup>39</sup>

However, this response has limited force against the objection. Even if it follows given the Atemporalist B-theory that (42) is equivalent to (43), it remains a significant cost of the Atemporalist B-theorist's view that she accepts the truth of sentences such as (42) of the form ' $\varphi \wedge \forall\varphi$ '. After all, it matters just as much given the B-theory as it does given e.g. Presentism or the Growing Block Theory which *tensed* sentences are true. If it did not, then (for example) the Implausibility Objection against the RB-theory from the truth on that view of sentences such as

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<sup>39</sup> I am grateful to an anonymous referee for drawing my attention to this possible response.

(17)  $\neg \exists xDx$

would have no force – RB-theorists could simply respond that on their view, (17) is equivalent to

(16)  $\exists xDx$

which is not at all implausible given the B-theory. Similarly, if it didn't matter which tensed sentences were true given the B-theory, there would be no good reason for RB-theorists to restrict Redundancy to qualitative sentences – they could instead accept the simpler thesis of *Total Redundancy*:

TOTAL REDUNDANCY: For any sentence  $\varphi$ ,  $P\varphi$  and  $F\varphi$  are equivalent to  $\varphi$

But of course, there are excellent reasons for RB-theorists to prefer Redundancy to Total Redundancy: given the standard definitions of the tense operators 'S' and 'A' in terms of 'P' and 'F' (see §1 above), Total Redundancy implies *Permanentalism*:

PERMANENTALISM: For any sentence  $\varphi$ ,  $\varphi \supset A\varphi$

And Permanentalism is implausible: if it is true, then given that I am sitting it follows that

(44) I am always sitting

Now suppose a Permanentarianist B-theorist tried to defend their view by arguing that given the Permanentarianist B-theory, what (44) *really means* is that I am sitting. It should be clear that this response would do little to address the implausibility of the Permanentarianist B-theory.

More generally, as we saw above in §1, an important part of the B-theoretic project is to provide a ‘metaphysical semantics’ for QTL (Quantified Tense Logic) in the B-theorist’s fundamental, operator-free language – and the problems generated by Locator described in §2 show is that this is not a straightforward task. But the fact that the B-theorist’s *fundamental* language is free of tense operators does not mean that she can simply ignore the consequences for QTL of any proposed solution to the problems generated by Locator. In particular, the axioms of QTL are no less plausible for being stated in a non-fundamental language – and therefore any strategy for avoiding the problems generated by Locator that rejects them bears a significant cost.

A more plausible way for the B-theorist to reject Sometimes Introduction is to argue as follows:<sup>40</sup> first, there are distinct *tensed* and *tenseless* languages, where if a language L is tensed then all of the quantifiers of L are either tensed or equivalent to a disjunction of tensed quantifiers. In particular, natural language English (just ‘English’ from now on) is tensed in this sense: English quantifiers must always be read as either past, present, or future tensed (or as a disjunction of all three). For example, here is Stoneham (2009, 202-3, emphasis added):

The English verbs ‘to exist’ and ‘to be’ *must always be tensed*: we cannot say that something exists without saying more specifically that it does [now], has or will exist.

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<sup>40</sup> Parsons (2012, §5) describes and rejects the modal analogue of this strategy.

In contrast, tenseless languages contain ‘tenseless quantifiers’: i.e. quantifiers that carry no temporal information whatsoever, and so are not even equivalent to a disjunction of tensed quantifiers. For example, it is natural to think that the quantifiers of standard first-order predicate logic (‘ $\forall$ ’ and ‘ $\exists$ ’) are tenseless in this sense. If so, then standard first-order predicate logic is a tenseless language.<sup>41</sup>

With the distinction between tensed and tenseless languages in mind, consider (e.g.) the argument from Locator, Times and Sometimes Introduction to the contradictory (10):

(10) There is an instant  $t$  such that there are many instants located at  $t$

If Times (‘There are many instants’) as it appears in that argument is a sentence of *English*, then given that all English quantifiers are tensed, Times is false: even given the B-theory, it is not the case *there are now* many instants; *there is now* exactly one instant.<sup>42</sup> So Times as it appears in that argument must contain a tenseless quantifier, in which case it is a *tenseless sentence*. (If it is not then the argument from Locator, Times and Sometimes Introduction to (10) is unsound, and Locator does not generate a problem for B-theorists). But if Times is a tenseless sentence, it is not a legitimate substitution-instance of Sometimes Introduction, because Sometimes Introduction is a logical truth only when what is substituted for  $\varphi$  is a *tensed* sentence. Moreover, this does not commit the B-theorist to the truth of sentence (42)

(42) There are many instants and there are never many instants

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<sup>41</sup> See Stoneham (2009) for an argument that the quantifiers of standard first-order predicate logic must ultimately be understood as tensed. See Deasy (forthcoming, *Synthese*) for a response to this argument.

<sup>42</sup> It is also false according to the B-theory that *there are now, were, or will be* many instants.

because for any tenseless sentence  $\varphi$ , tense operators cannot (meaningfully) be applied to  $\varphi$  – in that sense, tenseless sentences are simply ‘out of the tense game’. More generally, B-theorists can avoid the problems generated by Locator by arguing that sentences such as Times and Non-instantmates are true given the B-theory *only if they are tenseless sentences* – in which case, they are not legitimate substitution-instances of Sometimes Introduction, as they cannot (meaningfully) be combined with tense operators such as ‘S’.

The problem with the above argument is that it relies on a premise that B-theorists should reject, namely, that all English quantifiers are either tensed or equivalent to a disjunction of tensed quantifiers. Call this thesis *Tensed Quantifiers*:

TENSED QUANTIFIERS: All English quantifiers are either tensed or equivalent to a disjunction of tensed quantifiers

There are a number of good reasons for B-theorists to reject Tensed Quantifiers. First, Tensed Quantifiers implies that it is impossible for B-theorists to state their characteristic theses in English (or any other tensed language). For example, as we saw in §2 above, B-theorists typically hold that

$$(6) \exists x(Tx \wedge x < n \wedge \exists y(Dy \wedge L(y,x)))$$

*(Informally: There are dinosaurs located at a past instant)*

which implies

$$(16) \exists xDx$$

*(Informally: There are (quantifying unrestrictedly) dinosaurs)*

However, given Tensed Quantifiers, B-theorists simply cannot assert (16) in English – the best they can do is assert the sentence

(45) There are now, were, or will be dinosaurs

But (45) fails to express a characteristically B-theoretic thesis: for example, no Presentist would deny that there were dinosaurs, and therefore that (45) is true. It follows that given Tensed Quantifiers, the only way for B-theorists to express their characteristic theses is to use a language – call it *Eternalese* – that extends English by the addition of the tenseless quantifiers ‘ $\exists$ ’ and ‘ $\forall$ ’ whose domain is distinct from the domains of the past, present and future tensed quantifiers of English.<sup>43</sup> Eternalese is the ‘home’ language of the B-theory: it is only when B-theorists speak Eternalese that they succeed in expressing characteristically B-theoretic theses.<sup>44</sup> Brogaard (2012, 152) describes something like this view:

One might, of course, insist that the ontological commitments of the metaphysical eternalist [i.e. B-theorist] are inexpressible in English. When philosophers say things like ‘Socrates exists,’ they might be taken to speak a regimented language that, in spite of being superficially similar to English, allows for additional readings of tensed sentences.

The problem is that it is very hard to believe that B-theorists cannot express their

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<sup>43</sup> Tenseless quantifiers might be characterised as the quantifiers of the fundamental ‘joint carving’ language – see especially Sider (2004, §2.2) and Sider (2011).

<sup>44</sup> Note that as well as rejecting Sometimes Introduction, B-theorists who accept Tensed Quantifiers will also reject Locator as either as a claim about English or as a claim about Eternalese. However, they can still hold that e.g. the English sentence ‘There were dinosaurs’ (with past tensed quantifier ‘there were’) is true iff there are dinosaurs located at some past instant (with tenseless quantifier ‘there are’) – and more generally, that all tensed facts are ‘grounded in’ tenseless facts. In that sense, such B-theorists can think of Locator as a ‘translation manual’ from English to Eternalese.

characteristic theses in English. The natural view is that in order to express a true proposition concerning the existence simpliciter of dinosaurs, B-theorists simply need to use the unrestricted ‘existential’ quantifier in English – in other words, to utter some sentence of English with the logical form ‘ $\exists xDx$ ’. And it is not just B-theorists who cannot express their characteristic views in English given Tensed Quantifiers. For example, consider the sentences:

(46) The universe is expanding

(47) There are two English Queens named ‘Elizabeth’

Given Tensed Quantifiers, whenever anyone assertively utters (46) or (47) they either express a falsehood, or express a truth but are not speaking English. However, that seems wrong: surely Neil deGrasse Tyson can use (46) to express a truth – rather than an obvious falsehood – without ceasing to speak English, and surely a student of history can use (47) to express a truth – rather than an obvious falsehood – without ceasing to speak English.<sup>45</sup>

More generally, from the perspective of one who *rejects* Tensed Quantifiers, the view appears to be one according to which there is no genuinely unrestricted quantification in English – but rather that all quantification is restricted either to what there is now, was, or will be (or some disjunction of these).<sup>46</sup> However, it is very hard to believe that there is no unrestricted quantification in English. To use an example of Williamson’s (2003,415-6), when Quine (1961) asks ‘What is there?’ and answers ‘Everything’, it is clear that he is both speaking English and quantifying unrestrictedly – he is not asking the question ‘What is there

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<sup>45</sup> Brogaard (2012, 152-3) makes a similar argument.

<sup>46</sup> Of course, the defender of Tensed Quantifiers will reject this characterisation of their view – they will say that what we are calling ‘unrestricted quantification’ here is really just ‘tenseless quantification’.

now?’ (or ‘What is now, was, or will be?’), and he does not answer ‘Everything there is now’ (or ‘Everything there is now, was, or will be’).

Moreover, it is hard to see why we should think that there is no genuinely unrestricted quantification in English. After all, the B-theoretic defender of Tensed Quantifiers cannot claim that there is no such thing as unrestricted quantification: as a B-theorist, she must allow that she can use unrestricted quantifiers (‘tenseless quantifiers’) in order to express her theory. But if we can understand and express unrestricted quantifiers, there seems to be no good reason to deny that unrestricted quantifiers can be understood and expressed in English. Even if unrestricted quantification is in some sense an innovation, English can surely expand to encompass expressions that express the relevant notions.<sup>47</sup>

## 5. Conclusion

The problems for Modal Realists generated by M-Locator are well-known, and continue to receive significant attention from theorists. However, the analogous problems for B-theorists has received much less attention. This is surprising, because – as far as I am aware – the B-theory has significantly more adherents than Modal Realism. In this paper I have attempted to redress the balance somewhat by focusing primarily on the temporal case. In particular, I have argued that B-theorists should respond to the problems for their view generated by Locator by rejecting Locator in favour of Redundancy, the view that the standard tense operators are redundant when the sentences in their scope are qualitative.

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<sup>47</sup> The defender of Tensed Quantifiers might respond to this point as follows: given the Principle of Charity, the English expression ‘there is’ cannot be read as expressing the same notion as the ‘tenseless quantifier’ of Eternalism, because English speakers typically regard sentences like ‘There are dinosaurs’ as obviously false (see, for example, Hirsch 2004). Opponents of Tensed Quantifiers can respond to this point by arguing *à la* Sider (2011) that the unrestricted sense of ‘there is’ is a *highly eligible* meaning, and that this eligibility outweighs the relevant divergence of usage.



The arguments in favour of Redundancy are not decisive. But whether or not B-theorists accept them, what the ‘advanced temporalising’ debate shows is that it matters a great deal how B-theorists interpret the standard tense operators. This is something of which it is easy to lose sight when one is thinking about the B-theory, because the view is routinely characterized as a theory according to which tense is not required in order to provide a fundamental description of reality. But even if there are no tense operators (or predicates like ‘is past’ and ‘is present’) in the B-theorist’s fundamental ‘joint-carving’ language, B-theorists still have important questions to answer concerning the ‘tensed’ implications of their view – for example, whether or not the B-theory implies Qualitative Permanentarianism. Given that this question can be understood as the question of whether, according to the B-theory, there is change in the qualitative facts, it is an important question for B-theorists to answer.

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