TIME, TRUTH AND REALISM
An Essay on the Semantics and Metaphysics of Tense

by

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Different beliefs concerning the metaphysical status of tense divide philosophers into two camps. Those who embrace a tensed theory of time (often called the 'A-series') argue that past, present and future correspond to genuine ontological distinctions. Those who deny the reality of such distinctions espouse a tenseless theory of time (known as the 'B-series'). In this essay I defend a tenseless account.

I begin with an examination of the most prominent ontological conceptions of tense, finding them to be incoherent at worst, highly implausible at best. I then turn my attention to Einstein's Special Theory of Relativity, arguing that, properly understood, it demonstrates that tenses could not be physically realized. The upshot is that tense is not a philosophically viable notion. If time is real, it must be tenseless.

Therefore, the choice is between tenseless time and some sort of temporal idealism. Defending the former alternative, I focus my efforts, in the second part of the essay, on responding to the most important objections to a tense-free ontology. I argue that tenseless time: (1) can explain the semantics of tensed sentences; (2) does not entail fatalism or determinism of any kind; and (3) is consistent with our mental experience. These results indicate that tense is a feature of perception, not a property of time itself.

In the third part of the essay I argue that theories that constrain truth epistemically are poorly motivated and implausible. Therefore, in considering the status of tense, ontological considerations can rightly take precedence over epistemic concerns. This defuses objections to tenseless time that are based on the obvious fact that the past, present and future differ with respect to their epistemic accessibility. It is, therefore, consistent to hold that time is epistemically asymmetric but ontologically symmetric.
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I think that we can, however imperfectly, mirror the world, like Leibniz's monads; and I think it is the duty of the philosopher to make himself as undistorting a mirror as he can. But it is also his duty to recognise such distortions as are inevitable from our very nature. Of these, the most fundamental is that we view the world from the point of view of the here and now, not with that large impartiality which theists attribute to the Deity.

Bertrand Russell, *My Philosophical Development*. 
Introduction

Different beliefs concerning the metaphysical status of tense divide philosophers into two camps. Those who embrace a tensed theory of time (often called the 'A-series') argue that past, present and future correspond to genuine ontological distinctions. Those who deny the reality of such distinctions espouse a tenseless theory of time (known as the 'B-series'). In this essay I defend a tenseless account.

The current philosophical debate over the status of tense took shape in 1908 with the publication of McTaggart's famous article, 'The Unreality of Time'. There, McTaggart distinguished tensed from tenseless ways of thinking about time and argued that tense was both incoherent and the essence of time. He concluded that time is not real. Tenseless theorists tend to accept McTaggart's incoherence claim but reject his essence claim; vice versa for tense theorists. The tenseless cause has been advocated by such luminaries as Russell, Quine, Grünbaum, Smart, Horwich and Mellor. Tensed theories have been defended by notables such as Broad, Whitehead, Prior, Sellars, Tooley, McCall and, most recently, Quentin Smith. Debates that continue, decade after decade, to win adherents to either side are looked upon with suspicion and even distress by some philosophers who subsequently look to dissolve the issue by arguing that it is merely a pseudo-problem. I, however, take the long standing disagreement over tense to be an indication that something profound is at stake; important issues are never solved overnight. Over the course of this essay, I hope to demonstrate that the dispute over the status of tense is a genuine philosophical problem, one that deserves a solution, not dissolution.
Indeed, I believe that every philosopher would do well to take a stance on tense; it is one of the most fundamental questions of ontology with implications for one's views on existence, reality, truth, mind, ethics and science. One's worldview is certain to be affected by one's position here. For example, many tensed accounts of time are motivated by the belief that future events don't exist, or that only present events exist. Tenseless accounts cede equal ontological status to all events. In this respect, then, the two views amount to different views on the nature of reality and existence. Similarly, tensed accounts of time characteristically reject the application of bivalence to future or future and past tense propositions; tenseless accounts render plausible the universal application of bivalence. Moreover, time is fundamental to many aspects of experience such as memory, perception, and the formation of intentions. Hence, different views on the nature of tense are bound to affect what one believes is going on in such mental processes. The belief that future individuals are as real as those who exist now has potential ethical implications: perhaps we need to take better account of how our actions affect the future. In the philosophy of science, some have argued that quantum mechanics counts in favour of the existence of tense, others have countered that special relativity counts against it. It is clear, then, that many areas of philosophy have some stake in the tensed/tenseless dispute in the philosophy of time. It should come as no surprise that the debate continues.

The structure of this essay is as follows. In chapter 1 I examine the most prominent tensed accounts of time, finding them to be incoherent at worst, highly implausible at best. The natural starting point is McTaggart's argument, one which, I argue, supports the conclusion that tenses construed as properties of events are incoherent. Alternative conceptions of ontological tenses (I look at those proposed by Broad/Tooley, McCall, and Prior) also succumb to profound difficulties.

In a remarkable confluence of physics and metaphysics, 1908 also witnessed the publication of Minkowski's famous 'Space and Time'. Though utterly different in content
than McTaggart's article, Minkowski's piece renders it impossible to believe that our ordinary conception of time does not require modification. Since a tenseless account of time is certainly a modification of our ordinary conception, Minkowski's influential interpretation of Einstein supports the tenseless theorist's reaction to McTaggart's article. Or so I argue in chapter 2, where Einstein's Special Theory of Relativity is examined and found to support the physical unreality of tense. Any attempt to modify the theory (and there have been many) is groundless since, as chapter 1 indicates, a commitment to ontological tenses is not philosophically well-founded. Therefore, if time is real it must be tenseless.

We have, then, a choice: tenseless, real time or else some form of temporal idealism. But temporal idealism entails absolute idealism since time is clearly the most fundamental physical parameter (as time goes, so goes the world, one might say). Hence a tenseless account of time is the preferable option. Nonetheless, there remain important challenges to take up. The tenseless theorist must not only defend the need for a tenseless account of time but must also render the theory plausible by indicating how it can account for those phenomena, the explanations of which have traditionally been taken to require the existence of ontological tenses. After all, if a certain phenomenon is determined to be unreal for reasons \(x, y\) and \(z\), but also found to be necessary for reasons \(a, b\) and \(c\), then what we are left with is philosophical bewilderment rather than progress.

A recent charge against tenseless accounts of time is that they can account neither for the ineliminability of tensed sentences from language nor for certain obviously valid entailment relations between them. I address these objections (raised most forcefully by Quentin Smith) in chapter 3. What is required here is the direct theory of indexical reference (as found most famously in Kaplan 1989) whereby tensed terms such as 'now' rigidly designate their time of utterance. Employing these resources, I sketch out a tenseless account of the troublesome entailment relations that is consistent with the
ineliminability of tensed sentences. I finish this chapter with a defense of the direct
theory of reference as applied to temporal indexicals.

A second, long-standing complaint is that tenseless accounts of time are fatalistic
and deterministic since they render future events (including our future actions) as real as
past and present events, which are, it is plausible to assume, fixed and immutable. This
objection is addressed in chapter 4 where I argue that the ontological parity characteristic
of the B-series renders future events determinate but not necessarily determined. Since
events can, therefore, be actual without being necessary, the future need not be inevitable
even if ontologically indistinguishable from the past and present. By appealing,
Furthermore, to the directionality (from earlier to later) of causation, I present a tenseless
explanation of our ability to affect the future but not the past.

Reflection on our temporal experience has seemed to some to furnish the grounds
for the most compelling argument against tenseless accounts of time. It is commonly
claimed that we are directly aware of the passage of time and that we are able to perceive
that present events are ontologically distinguished from their fellows. In chapter 5 I
provide an explanation of our experience of time that is consistent with a tenseless
ontology. I argue that by distinguishing between properties of the act of perception and
properties of the object of perception we can account for the fact that the world seems to
be tensed even though it isn’t. I finish the chapter with a discussion of our perception of
succession, something that, surprisingly, gives the B-theorist some difficulty.

Finally, In chapter 6, I defend the methodology of the essay, arguing that theories
that constrain truth epistemically are poorly motivated and implausible. Therefore, in
considering the status of tense, ontological considerations can rightly take precedence
over epistemic concerns. This defuses objections to tenseless time that are based on the
obvious fact that the past, present and future differ with respect to their epistemic
accessibility. It is, therefore, consistent to hold that time is epistemically asymmetric but
ontologically symmetric.
Of course tense is not the only important issue in the philosophy of time. In this essay I do not address that other long-standing temporal debate, whether time is a substance or a system of relations. That is a question that deserves its own, separate treatment. Furthermore, I leave the ethical implications of tenseless time to another occasion, where they can be examined in appropriate detail. However, the results of this essay are of independent interest and constitute what I take to be the correct starting point for further investigations into the nature of time.
1

Tense and Alternative Conceptions of Time

1. Introduction

The purpose of this chapter is to defend the need for a tenseless theory of time by attacking its tensed opponents. I examine McTaggart's famous argument against the reality of time, contending that it succeeds as an argument against the construal of ontological tenses as properties of events. I then take a look at three well-known ontological theories of tense that are not property-based, and find each to be defective. Finally, I conclude that the facts are tenseless, that there are no ontological tenses. Hence the project of working out and defending tenseless time is philosophically well-grounded.

2. Tenses as Properties: McTaggart's Argument

Let's begin with a familiar story: McTaggart's famous argument against the reality of time (McTaggart 1908, 1921).\(^1\) McTaggart distinguished two ways of describing time that he called the *A-series* and the *B-series*, respectively. The B-series is a linear ordering of events\(^2\) with respect to the transitive, irreflexive, asymmetric relation *earlier than* (or its inverse, *later than*) and the transitive, reflexive, symmetric relation *simultaneous with*.\(^3\) The A-series attributes the properties *past*, *present* and *future* to events (McTaggart 1921, pp. 9-10). B-series relations are *permanent* meaning that their extensions do not vary with time. If an event, \(e_1\), is earlier than some other event, \(e_2\), by one week, then it is

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\(^1\)I will not attempt to thoroughly summarize the current state of the debate over McTaggart's argument as the literature is vast (some excellent surveys and discussions are found in Dummett 1964, Horwich 1987, Mellor 1998, and Oaklander 1984). Reconstructing the heart of McTaggart's position will suffice for my purposes.

\(^2\)Or moments of time; one can easily transfer talk of one to talk of the other.

\(^3\)Simultaneous with could be defined as an *earlier/later than* relation of zero magnitude, but it is worth distinguishing three separate relations.
always true that \( e_1 \) precedes \( e_2 \) by one week. On the other hand, A-series predications are constantly changing. For example, a present event was future and will be past.

McTaggart argued that the A-series is essential to time but contradictory in nature, hence that time is unreal. It will turn out that the first contention is not well-founded, but that McTaggart was onto something important in the latter. So let us examine the alleged contradiction lurking beneath the surface of the A-series. The problem is that every event must be past, present and future if the A-series is to capture the suggestion that time passes, but no event can be all three. Letting 'P', 'N' and 'F' stand for 'past', 'present', and 'future' respectively, the passage of time entails that

\[
\begin{align*}
(1) \ & Pe \ & Ne \ & Fe \\
(2) \ & Pe \ & \text{entails not-Ne and not-Fe}, \\
(3) \ & Ne \ & \text{entails not-Pe and not-Fe}, \ \\
(4) \ & Fe \ & \text{entails not-Pe and not-Ne}.
\end{align*}
\]

After all, if \( e \) is present, it is neither past nor future, if it is future, it is neither past nor present, and so on. Hence the A-series is incoherent.

The familiar A-theorist response, which McTaggart anticipated (1921, pp. 21-3), is that while each event has all three tenses, no event has them simultaneously. In other words, \( e \) might be present, but in that case it was future and will be past. Hence,

\[
(5) \ FPe \ & \ NNe \ & \ PFe
\]

is true of every event, but consistent. But, McTaggart points out, what (5) amounts to is the assertion that \( e \) is present at a moment of present time, future at a moment of past time and past at a moment of future time. In other words, first order tense ascriptions are made
consistent by specifying the times at which they are held. McTaggart complains, however, that like any event, each moment of time is itself past, present and future, which is absurd.

Unless, of course, one insists that a given moment of time, \( t \), is *now* present, *will be* past, and *was* future. But this means that \( t \) is present at a moment of present time, will be past at a moment of future time, and was future at a moment of past time. Since each of these times is past, present and future, it follows that recourse to yet a higher order of tense ascriptions is required, and so on *ad infinitum*. Another way of putting the point is to notice that once the reiteration of tenses as in (5) has been allowed, incompatible second-order tenses such as 'NPe', 'NNe' and 'NFe' are similarly generated (and the A-theorist seems to have no way of ruling these out that is not *ad hoc*). If we attempt to escape this difficulty by using third-order ascriptions, further contradictions await; and so on. Since at no level of explanation has the contradiction been removed, tenses are contradictory and therefore unreal.

Some notable complaints have been directed at this line of argument. Steven Savitt, to take a recent example, argues that the A-theorist need not admit that the sense in which the ascription of tensed properties entails (1) also entails (2) - (4), nor vice versa (Savitt 1991). Savitt follows Broad (1938) in distinguishing two senses of the copula 'is': (i) a temporal sense in which \( X \) is \( Y \) implies that \( X \) is *now* \( Y \); and (ii) a non-temporal sense that is akin to the 'is' of logical predication and does not entail that the object under consideration currently has a given property, as in, for example, 'two is an even number' (Savitt 1991, pp. 406-7).

According to Savitt, the A-theorist can accept (1) as well as (2) - (4) by distinguishing the senses of 'is' in the two sets: she accepts (1) only given the non-temporal use of 'is' while she accepts (2) - (4) only given the temporal sense of 'is'. If we

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\[ ^4 \]However, he does believe that physics, in particular Einstein's General Theory of Relativity, is sufficient to make the case against tensed theories of time (Savitt 1994).
demand that 'is' be interpreted univocally, then on sense (i), (1) is false but (2) - (4) are true while on sense (ii), (1) is true but (2) - (4) are false. Hence, the contradiction is avoided.

But only apparently. The problem is that on either reading of 'is', (1) can only be made false or true respectively if it makes sense to say that an event has its A-determinations successively, i.e. at different times. Let us first take case (i), i.e. assume that 'is' is in the present tense. Then (1) says that e is now past, present and future, which is false (though (2) - (4) are true). On this understanding, (1) is false because e has the attributes of past, present and future at different times while (1) claims that it has them at a given time. To deny this would be to deny that every event is past, present and future, which is to give up the A-theory of time (along similar lines, McTaggart asserts that understanding the meaning of any A-determination presupposes an understanding of all of them, 1921, p. 20). It is because the tensed 'is' takes the succession of tenses into account that (1) can be seen to be false while (2) - (4) remain true.

Consider next case (ii). The 'is' of predication allows (1) to be true (and (2) - (4) false) as follows. Since this sense of 'is' does not entail that e is now past, present and future, (1) is made consistent by assuming that e has each of its tensed properties at different times. For example, if we read (1) as claiming that e is future at t₁, present at t₂, and past at t₃, then it is clearly not a contradiction. If, on the other hand, events can't have these predications successively, then it is clear that (1) is a contradiction for a given event can only consistently have incompatible properties if it has them at different times. Tenses therefore must be understood as properties of events that they have successively if we are to avoid contradiction.

However, it is now clear that the A-theorist is forced to admit that tenses are relational properties, i.e. properties whose ascriptions must be temporally indexed. After all, it is only by insisting that tense specifications include reference to when they are possessed by an event that they are made coherent. Hence, if A-determinations were not
temporally indexed, i.e. if they were construed as monadic properties of events, then the
Broad/Savitt way out of the contradiction would not succeed. McTaggart himself
realized that the A-series terms must be construed as relational. But as relations to what?
Since even A-relations between events in the time series are unchanging, it follows that
tenses, in order to change, must be relations to something outside of the time series
(outside of both the A- and B-series). Otherwise the A-series is unable to capture the
dynamic aspect of time (McTaggart 1921, pp. 19-20).

I take it that contemporary defenders of ontological tense would, however, be
unwilling to commit to tense as a relation to a non-temporal entity, a NOW, that is
outside of time but with respect to which all events and times can be related as past,
present or future. The prospects of making sense of such a notion are grim indeed. For
instance, how can events in the A-series be related as later than, simultaneous with, past,
future, or what have you to something that is itself atemporal? If the NOW is outside of
time, it follow that it has no temporal relations to events or times. The NOW would,
therefore, have to be embedded in a higher order time series, a supertime that can have
temporal relations to regular time, but here an infinite regress of time series threatens.
(What's more, finding something in reality to correspond to this atemporal NOW seems
unlikely. Indeed, if time depends on something atemporal, one is at this point more
tempted to reject the claim that the B-series is inadequate than to defend ontological
tense.)

These considerations suggest that tenses are best conceived of as relations events
have to times rather than to something outside of time. Hence, simple A-determinations
such as 'e is present', 'e is past' or 'e is future' are not perspicuously written. In order to

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5It is always true, for example, that the end of World War II is past relative to the first moon landing. The relation past by 24 years always holds between those events.
6The NOW, on this picture, is like a spotlight that is above a fixed filmstrip (the timeline) but which successively illuminates the different frames.
7Or to events. I shall ignore the difference here.
render past, present and future consistent, every attribution of tense must be of the form 'e is past at t', 'e is present at t\(*\), and so on. Hence, (1) should in fact read,

(1') P(e, t_3) & N(e, t_2) & F(e, t_1)

which is consistent on either the tensed or tenseless reading of the copula. But now a new problem arises for the A-theorist, namely, how to construe the terms of (1’) so that they are distinguishable from the B-series relations of earlier than, simultaneous with and later than respectively. After all, the defender of tenseless time maintains that the B-relations are sufficient for a complete description of time. Hence, she can cheerfully commit to such properties as past, present and future so long as they are understood as the familiar B-relations predicated with respect to different points of temporal reference. In other words, for the tenseless theorist,

(6) P(e, t) is equivalent to e is earlier than t

(7) N(e, t) is equivalent to e is simultaneous with t

(8) F(e, t) is equivalent to e is later than t

So at this point the challenge to the A-theorist is to come up with some content to ascriptions of tense that goes beyond relational predications such as (6) - (8) but that escapes McTaggart's contradiction. But this is not going to be easy. After all, though the opponent of McTaggart (at least in the guise of Broad/Savitt) introduced the relational senses of tense attributions in order to avoid contradiction, she has not said what it is about past, present and future that distinguishes them from B-relations and hence is capable of capturing the transitory aspects of time. The A-theorist finds herself in a far less satisfactory position than her B-theorist opponent whose strategy is simply to take (6)

\footnote{I am not taking a stance on the nature of this equivalence since the point is not crucial for my purposes here. It is clear that something other than extensional equivalence is desired since the B-theorist thinks that A-determinations are at the very least confused. Perhaps one would want to go so far as to use intensional or meaning equivalence, but logical equivalence should suffice.}
(8) as the full specification of tensed properties, something that is parsimonious as well as consistent.

At this point, the defender of ontological tense might suggest that we adopt a mixed A-/B-theory of time. That is, the tense theorist could be willing to admit that time does involve permanent B-relations, but that in addition to these there exists a property that is itself monadic, call this \textit{m-presentness}, even though, of course, an event's having this property is something that happens only at a particular time. So, while the \textit{specification} of the inherence of \textit{m}-presentness will always be relational in that we must invariably indicate \textit{when} an event has it, the property itself is monadic, an entity that can pick up and move on to other events in its entirety. In this way, the fact that tense ascriptions are always temporally indexed is, it may be claimed, made to cohere with the existence of a genuine A-property.

Notice, however, that the successive possession by events of \textit{m}-presentness must amount to more than the mere fact that each event is present at the time at which it (tenselessly) occurs for this condition obtains at all times and does not distinguish \textit{m}-presentness from simultaneity. Rather, \textit{m}-presentness must capture the \textit{tensed} aspect of presentness, i.e. the idea that when an event is present it is \textit{currently} present, or present \textit{now}. In other words, it is the \textit{present tense} possession of \textit{m}-presentness that renders an event present. But in that case, it is not the property itself that is doing the work that the A-theorist wants it to do since it is not the intrinsic features of the property of \textit{m}-presentness that make an event present. Rather, it is the \textit{present} inherence of \textit{m}-presentness that makes an event present, the \textit{past} inherence of \textit{m}-presentness that makes an event past and the \textit{future} inherence of \textit{m}-presentness that makes an event future. So a viable understanding of ontological tense, one that goes beyond B-relations, has not been achieved by the \textit{m}-property view simply because the view \textit{presupposes} the tensed notions \textit{past, present and future}, all of which remain to be explicated. If the explanation proceeds in terms of tensed properties, then an infinite regress threatens, and a vicious one for at no
stage along the way will tense have been explicated in such a way that it has more than B-content. Therefore, the m-property response does not escape McTaggart's contradiction as it is unable to explain what tense is without depending on a prior understanding of tense, one that is either as contradictory as McTaggart argues or else left unexplained.  

3. Infinite Reflexive Properties
Quentin Smith has argued that tensed properties are 'infinitely reflexive', i.e. they engender an infinite regress but as it is a regress of reflexive predications, it is not vicious (Smith 1986). According to Smith, to say of an event, e, that it is present is to say more than that

(9) e is present

where 'is' is in the present tense. After all, as I suggested in section 2 above, to be present is to be (present tense) present, i.e. to be now present. Hence, if e is present then its presentness is also present, i.e., (9) entails,

(9') e is present, and the being present of e is present

where all the copulas are in the present tense (Smith 1986, pp. 184-5). But, Smith continues, if the inherence of presentness in e is present, then that inherence must itself be present. It certainly can't be past or future: if e is (present tense) present, then it is impossible that, for example, the being present of e's presentness is past for that would

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9This argument has a structural similarity to McTaggart's view that the only way the B-series could be a temporal series is if it is ordered (i.e. with respect to earlier than or later than). However, McTaggart believes that only a moving NOW can give a static series an order, hence he argued that the B-series must be derivative, i.e. based on a non-temporal C-series (simply an unordered line) and the moving NOW (A-series). Therefore, on McTaggart's conception of time, if the B-series were appealed to in order to make the A-series consistent, this would be circular since the temporal nature of the B-series presupposes the A-series. (See McTaggart 1921, pp. 11-13 and Oaklander 1987).
mean simply that e was presently present, which amounts to saying it is (present tense) past. Hence (9') entails,

(9") e is present, and the being present of e is present, and the being present of the being present of e is present, and so on, infinitely (Smith 1986, p. 185).

(Again, all copulas are in the present tense.) Smith has similar analyses of the locutions 'e is past' and 'e is future'. To say that e is past is to say that

(10) e is past, and the being past of e is present, and the being present of the being past of e is present, and so on, infinitely (Smith 1986, p. 187).

Finally to say that e is future is to say that

(11) e is future, and the being future of e is present, and the being present of the being future of e is present, and so on, infinitely.

The question here is whether Smith's view does any better than the m-property view considered above. Obviously the answer depends on whether one can make attributions such as (9) intelligible. After all, the piling on of higher order inferences of presentness in the inference of the property of presentness is of no use unless that initial predication can evade McTaggart's arguments. Now Smith includes the infinite regression of inferences of presentness in order to explicate how the property makes an event currently present as opposed to simply occurring (tenselessly) at some time t. But this move depends on the coherence of the first order ascription of presentness, as can be seen if (9") is rewritten as follows,

(9*) . . . present (present (present, e))

(where the suppressed copulas are tensed). This schema can only be coherent if the innermost predication, '(present, e)', is coherent. But the arguments of the previous section have shown that the only way to make '(present, e)' coherent is to reduce it to the
B-series relation of simultaneity. Any attempt to give this predication A-content is either contradictory or circular. Therefore Smith's attempt to respond to McTaggart does not succeed.

There is a further difficulty concerning Smith's proposal that can be seen if we recall that it must fulfill two aims: (i) to indicate how the property of presentness makes an event present now rather than simply existing at its B-location; and (ii) to make good on the response to McTaggart that A-attributions are consistent so long as they are possessed by an event successively as opposed to simultaneously. I have argued that the first aim has not been achieved so I will now turn my attention briefly to the second. While the A-theorist admits that, since time passes, every event is past, present and future, she interprets this to mean that

(12)  $e$ is (present tense) present, will be past and has been future

or

(12') $e$ is (present tense) past, has been present and future

or

(12'') $e$ is (present tense) future, will be present and past.

Smith's theory must also capture this feature of tense if it is to succeed.

Unfortunately for Smith, he does not provide the tools to make sense of this succession in a coherent manner, as Oaklander has pointed out (Oaklander 1987, 1996). Consider (12'), for example. Smith has to be able to make sense not only of the claim that $e$ has been present and future, but, moreover, that the inherence of futureness in $e$ precedes the inherence of presentness in $e$. But if all one has recourse to is the series of infinitely reflexive properties, this cannot be done. After all, on Smith's view, to say that $e$ has been present and future is to say that the being present of $e$ is (now) past and the
being future of $e$ is (now) past. But this certainly does not entail that $e$ was future before it was past. Similar difficulties plague the attempt to make sense of (12) and (12") with Smith's resources (Oaklander 1996).

The only way for Smith to make good on the succession claim is to argue that tensed properties inhere in events at successive times, i.e. to have a mixed A-/B-theory of time, a theory that admits the need of the B-series but posits A-properties successively of events in that series. But this is, again, simply the m-property view considered and dismissed above. So Smith's theory has not given us any convincing reason to believe in ontological tenses.

4. The 'Empty Future' View

So much for the property view of tense. An alternative ontological conception of tense is the view associated with C. D. Broad (1923) and, more recently, Michael Tooley (1997). On this account only the past and present exist in any sense. The future is entirely 'empty', it is the realm of utter non-existence. Hence, the present can be defined as the last moment of time (it 'stands at the edge' of the void that is the future). As Broad put it, the world 'grows by accretion of facts', events come into existence by becoming later than the previously latest event. This view has the advantage of not being defined in McTaggart's A-terms. Rather, tensed time is built up out of the B-notion of succession and the idea of an event coming into existence later than a given time.

Some will simply take it as obvious that future events don't exist in any sense of the word, but it is notable that few arguments in favour of this stance are given. Certainly future events don't occur (tenselessly) now, they occur at later times. Moreover, future events are in general epistemically unavailable to us. But these considerations are insufficient to show that the future differs ontologically from the past and present. Worse, as we shall see in chapter 2, the empty future view is in tension with Einstein's Special Theory of Relativity, which demonstrates that an event that is measured to be
future by one observer may be present or even past for another observer and, therefore, quite determinate. Now Tooley (1997, pp. 335-71) and others have attempted to modify Einstein's theory so as to make it compatible with the ontology of the empty future, but since conclusive positive arguments for the empty future view are lacking, these attempts are unmotivated.

The empty future view has implausible semantic implications for future tense discourse. Consider some event, \( e \), that hasn't yet happened and assume that someone utters (now, at \( t \)),

\[(13) \text{ } e \text{ will occur at } t' \text{ } (t' > t).\]

Since the future, on the view under consideration, quite literally does not exist, this token must be false. If, at \( t \), event \( e \) does not exist (in the strong sense of the empty future view), then the statement made then to the effect that \( e \) exists at any time is false.\(^{10}\)

Assume further that \( e \) exists at \( t' \), i.e., \( e \) occurs (tenselessly) at \( t' \), just as the speaker of (13) predicted.\(^{11}\) There is no longer any reason to suppose that the speaker who uttered the \( t \)-token of (13) uttered something untrue. A universe in which \( e \) exists (tenselessly) at \( t' \) and in which a speaker says at any time that \( e \)'s time is \( t' \), is a universe in which an utterance and the condition required for the utterance to be true both exist. Hence, the utterance, at \( t \), of (13) must, presumably, become true.

But it is, at the very least, awkward to suppose that one and the same utterance can be both true and false. Notice that we are not considering two different utterances of the same sentence type but, rather, one and the same utterance. Furthermore, to have that

\(^{10}\)Some defenders of tense (e.g. DeRose 1998) have a 'half empty' view of the future whereby all and only those future events which are determined by events in the present or past can now be truthfully spoken of while all other future events don't exist in the strong sense considered here. I shall assume that event \( e \) is not causally predetermined.

\(^{11}\)We need not assume that her prediction was anything more than a lucky guess concerning a random event. I am here interested in the truth values of future tense sentences not any claims to the effect that we can know the future.
utterance become true would be to retroactively alter what the speaker said at t (for future tense utterances in general). The natural (and soothing) escape route is to admit that the t-token of (13) is always true, in which case the future is not really empty since it can be truthfully spoken about (see Mellor 1998, pp. 81-3). Though we may be unable to speak as reliably about the future as we can about the past, there is no reason to suppose that future events are not available as truth conditions for future tense statements.

The empty-futurist might respond to this by claiming that the proposition expressed by the t-token of (13) changes in truth value from t to t' and that since propositions are not dated particulars, they can change in truth value over time. Notice, first, that this still has the unpalatable consequence that the speaker's t-utterance goes from true to false so that the empty-futurist remains committed to continual retroactive alterations of the content of past statements. Secondly, this move requires, implausibly, that a proposition retain its identity even as its truth conditions change (two different conditions, e's non-existence and e's existence, must make one and the same expressed proposition first false, then true). Ordinarily, however, identity of truth conditions is considered necessary for propositional identity, and it is hard to see how one might deny this claim. If, for example, one says, at t, 'the World Series is starting' then one expresses the proposition that the World Series (a particular event) and t are simultaneous. If one utters a token of the same sentence type at t', then one expresses the proposition that the event and t' are simultaneous. Is it really convincing to claim that on each of these occasions one expresses the same proposition, that the World Series is starting, that can go from true to false? It is much more plausible to suggest that at each time the speaker makes a different claim, and therefore utters a different proposition (more on this in chapter 3).

Here is a final problem with the empty future view. Assume that it is now t, i.e. t is the latest moment at which events exist. The coming into being of, say, tomorrow, e, must obviously occur later than t for tomorrow certainly cannot come into existence in
the past. However, since the coming into existence of tomorrow determines what it is for a time to be later than \( t \), the explanation of this becoming cannot depend on a prior understanding of later than. Thus, the empty futurist cannot explicate the coming into existence of tomorrow along the following lines: at \( t \), \( e \) doesn't yet exist, but then (after \( t \)) \( e \) exists thereby determining/creating a \( t' \) that is later than \( t \). The problem is that this explanation depends on a prior understanding and use of the later than relation, but being later than \( t \) is precisely what the coming into being of \( e \) is supposed to explain. If we cannot assume that \( e \) is later than \( t \), then the fact that all events only come into being later than the present is left unexplained on the empty future view.

5. The 'Tree Model' of Reality

Another conception of ontological tense, the 'tree-model' of reality, is often taken to be inspired by Aristotle's discussion of future tense propositions in *De Interpretatione* (ch. 9). According to this model (recently advocated by Storrs McCall), the past is fixed and determinate while the future contains only unactualized possibilities. Hence, the 'trunk' of the tree represents the past, the 'branches' are the future, and the boundary between these two regions is the present. The passage of time is modeled by the 'falling away' of all future branches except one. Thus as time flows, the trunk of the universe grows longer and the present moves 'up' the tree. The present is the point at which the many future possibilities become whittled down into one actuality. Consequently, from any point on the tree there is only one past but many potential future routes (see figure 1). Since, according to the tree model, the future is ontologically indeterminate, this view is often combined with a revision of classical logic whereby only propositions in the present and past tense are bivalent. That is, future tense propositions are neither true nor false now, though they will perhaps become either true or false (hence this denial of bivalence is consistent with the universal application of the law of excluded middle).

Is this model really coherent? A common and obvious first objection is to point
out that the falling away of branches is a process that occurs in time (after all, they do not all fall at once). But in that case, the notion of 'branch attrition' (see McCall 1994) can't

really be used to define dynamic time for it presupposes some notion of time that can render coherent the successive elimination of future branches. In particular, if each branch represents a complete alternate future, then each branch must itself be a four-dimensional spacetime continuum. But then each branch includes time within itself, i.e. each branch has an internal timeline, so that if the falling away of branches is to define a rate of flow for time, it must occur in a higher order time, a supertime. However, now the tense-theorist needs to posit two time dimensions in order to have a model of time while the B-theorist can make do with one.

McCall replies that on his view, the branching tree model's internal time axis 'defines the moments of its own history' (McCall 1998, p. 320-1). In other words, he agrees that the trunk and branches contain a B-series that functions to order events. But at each successive B-series moment, a number of branches have disappeared compared to an earlier B-time; many if we consider a lengthy time interval, fewer if we consider a
short amount of time. Hence time flow (branch attrition) can be defined without recourse to supertime.

The response to this is twofold. First, I argue, in subsequent chapters, that such a wild metaphysical view is not needed since any phenomena it is taken to explain can be accounted for by the simpler, tenseless theory of time. Secondly, even if McCall's rebuttal succeeds against the first objection, there remains a more profound difficulty with the tree model: it entails that it is not one and the same universe that has a different branch structure at different times. At each moment of time the universe consists of a certain spacetime structure, i.e. a history and an array of future possibilities. But at each successive moment of time the history and the future array are different. How, then, do they add up to a single entity, the universe (or reality)? One way they could do so would be to posit a fifth dimension, the supertime alluded to above, in which all the four-dimensional universe slices are embedded. In other words, each four-dimensional universe is a supertime-slice of a five-dimensional entity. But this way regress threatens. So the tree model seems to lead to an ontological 'explosion' of as many distinct realities as there are moments of time, each reality complete with a past, present and future (see also Smart 1980).

McCall believes that this is akin to confusing a series of photographs of a person (i.e. the four-dimensional 'snapshots' of the universe at different times) with the person herself (i.e. the universe). In other words, the static representations of the dynamic universe at successive times are not the universe itself, so there is no ontological explosion (McCall 1998, pp. 319-20). The problem here is that it is not clear how the metaphorical contrast of pictures of a person with the person herself is to be transferred to the contrast between the various spacetime structures of the universe and the universe itself. Some of the many reasons that we don't confuse a photograph of Sophie with Sophie herself are that the photograph lacks an internal organ structure, cannot speak or think, cannot move, is only two dimensional, and so on. Hence the notion that photos are
a representation of something else is grounded in the difference between the photo and the object (though, of course, certain similarities must be retained for the photo to be accurate). But in the case of the universe at different times, each metaphorical 'snapshot' does indeed have all the features of a complete branching universe: it has a fixed (four-dimensional) past of determinate events, a highest branch point (i.e. the NOW), and an open future of (four-dimensional) possibilities. McCall does not explain why this structure is not itself a complete, distinct universe. Indeed, if it isn't, then in what sense is the universe right now a complete and distinct universe? McCall provides no answers to these questions.

Furthermore, in his earlier book, McCall proposes an interesting solution to the problem of diachronic identity. A three-dimensional object retains its identity across different times if it is part of the same four-dimensional object that is extended in time (McCall 1994, pp. 215-17). This picture naturally suggests that the different branch structures at different times are the same universe if they are part of the same five-dimensional object (i.e. spacetime plus supertime). Of course McCall rejects the notion of supertime (McCall 1998, p. 319) but without some other way of uniting the various changes that the branching universe undergoes into a single object, I can see no reason not to consider each branch structure to be a universe of its own. Therefore, in its attempt to model the passage of time, the tree model of reality entails that there are as many distinct universes as there are moments of time. Again, I believe that we are better off if we can make do without such a bizarre ontological view.

6. Event Identity and Presentism

William Lane Craig has recently contended that the lesson of McTaggart's argument against the reality of time is that the dispute over the status of tense is most profitably construed as a debate over the plausibility of a presentist metaphysics since presentism is the only tensed account of time that can, prima facie, escape McTaggart's reasoning
Unfortunately for the tense-theorist, presentism is subject to profound difficulties.

Craig argues that McTaggart's challenge to tense 'is a peculiar case of the Problem of Temporary Intrinsics' (Craig 1998, p. 123), in other words, the problem of how some entity can retain its diachronic identity if its intrinsic (i.e. non-relational) properties change from time to time. The notion of diachronic identity runs up against the principle of the Indiscernibility of Identicals,

\[(\Pi)\] If \(O\) at \(t\) is identical with \(O\) at \(t'\), then \(O\) at \(t\) is \(F\) iff \(O\) at \(t'\) is \(F\),

or recast in terms of events,

\[(\Pi e)\] If \(e\) at \(t\) is identical with \(e\) at \(t'\), then \(e\) at \(t\) is \(F\) iff \(e\) at \(t'\) is \(F\).

The problem for the A-theorist is that A-properties must be intrinsic properties of events that change over time. For example, the A-theorist would have to accept the following premises,

\[(14)\] \(e\) at \(t\) is identical with \(e\) at \(t'\) (for some event \(e\)).

\[(15)\] \(e\) at \(t\) is future.

\[(16)\] \(e\) at \(t'\) is present.\(^\text{12}\)

But then, given (\(\Pi e\)), \(e\) at \(t\) is not identical with \(e\) at \(t'\). Hence, contra (14), \(e\) does not retain its identity over time. But \(e\) must retain its identity over time for otherwise it is false to say that a given event is (at different times) past, present and future. Since the latter claim is central to tensed theories of time, they are false (Craig 1998, pp. 123–4).

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\(^\text{12}\)This does not entail that \(e\) must exist at both \(t\) and \(t'\) (something that is not generally the case). Rather, the point is that events don't change with time. For example, World War II is the same event now as it was in 1955, 1965, 1972, etc. There has been no change in the event during subsequent or, obviously, earlier years.
It is worth emphasizing that this dilemma does not arise for the B-theorist since it is a basic tenet of her theory that tenses are not intrinsic but, rather, relational properties, in particular the B-relations of earlier than, later than and simultaneous with. Hence alleged changes of tense merely reflect the fact that events in an object's lifetime have different relations to different times. Or, on behalf of the B-theorist who wishes to eschew talk of objects altogether, apparent changes in tense simply reflect the different relations the various temporal parts of a four-dimensional entity have to each other and to other events. Either way the problem of diachronic identity doesn't arise: in the first case the object undergoes merely relational change; in the second case there is no object whose identity needs to be maintained from one moment to the next.

The tense-theorist's only option, Craig concludes (pp. 125-6), is to adopt a metaphysics of presentism. On a presentist ontology, all property inferences are tensed; only what is present exists so only objects or events that currently exist (and their present properties) are real. So, as Craig puts it, 'the Problem of Temporary Intrinsics cannot arise because there are (present tense) no times that overlap in sharing an object O [or an event e]' (Craig 1998, p. 125). Hence, O (or e) only exists at one time, the present time, and cannot have incompatible properties for it only ever has the properties it now has (no matter what intrinsic changes it undergoes from t to t'). Let us examine the prospects of rescuing a tensed theory of time by appeal to presentism.

Presentism was favoured by A. N. Prior who argued that 'the present simply is the real considered in relation to two particular species of unreality, namely the past and the future' (Prior 1970, p. 245). An obvious first problem with this view is that it entails an extreme form of verificationism. Since the presentist asserts that the past and future do not exist, there is quite literally nothing for one to be referring to when using the past and future tenses. Thus, when one speaks in these tenses, the truth conditions of one's utterances can be nothing but current traces of non-existent events or else current portents of non-existent events. After all, things that do not exist cannot be truth makers.
Our metaphysical talk about the past and future must, on the presentist view, be construed as talk about currently available evidence about events that are not accessible, therefore about what can (perhaps in principle) be currently verified about other times. Given the profound problems with verificationism (see, for example, Putnam 1981, pp. 105-13 or Quine 1951), the B-theorist can rest content having saddled her opponent with the unenviable task of working out a verificationist semantics and epistemology.

Without going verificationist, how can the presentist understand a simple sentence such as 'John was running'? A non-presentist A-theorist like Quentin Smith (see his 1986) takes this sentence to assert that a tensed property (pastness) currently adheres in a certain event (John's run). While I have argued above that this view ultimately fails, it is at least a plausible first guess at what such sentences mean. The presentist, however, must reject this approach as her view entails that 'past' and 'future' do not refer to properties of events since past and future events and their properties do not exist to be the subjects of property ascriptions. Prior, for example, writes that views such as Smith's suggest 'that something called an event . . . has gone through a performance called receding into the past . . . even after it has ceased to exist' which is, he thinks, absurd (Prior 1962, p. 10).

Prior thus prefers to replace past tense sentences with compound sentences consisting of a past tense sentential operator prefixed to a present tense sentence, such as 'it was the case that John is running' or 'it was the case that the Battle of Waterloo is occurring' (Prior 1962, p. 8).\(^\text{13}\) Now, as Smith (1986) points out, the sentential operator is either about the sentence that it modifies or else it is about the referent of that sentence, i.e. the event with which the sentence is concerned. In other words, either it says that 'the Battle of Waterloo is occurring' was true or else it says that the Battle of Waterloo did occur. Presumably, however, a once true sentence referred to some event so that to say

\(^{13}\)Similarly, one should use the prefix 'it will be the case that' to form future tense sentences.
that the sentence was true is to say that some event did occur. Therefore, both interpretations amount to the same claim. What is still unclear is how the non-verificationist presentist understands claims such as 'e occurred in the past'.

Prior was aware of the difficulty here. He considers the case of Queen Anne, who has died some time ago: 'can a statement really be about Queen Anne after she has ceased to be?' (Prior 1962, p. 11). Prior thinks not and he suggests instead that facts about past people and their changes\(^1\) are what he calls general facts (for example 'someone stole my pencil') that are distinct from and do not entail any particular fact (such as 'John stole my pencil').\(^2\) So, for example,

\[(17) \text{ It was the case that (for some specific } e \text{ (} e \text{ is a battle, } e \text{ occurs at Waterloo, etc.))} \]

differs from, and does not entail that

\[(18) \text{ For some specific } e \text{ (it was the case that (} e \text{ is a battle, } e \text{ occurs at Waterloo, etc.))}. \]

(A general past tense fact such as (17) amounts to a \textit{de dicto} reading of the 'it was the case that' operator while (18) is its \textit{de re} reading.)

Prior argues that (17) can be true and yet remain faithful to the presentist's core idea that nothing non-present exists since (17) is not strictly about any specific entity, or 'if it is about anything . . . it is about the earth, maybe, which has rolled around the sun so many times since there was [a battle that occurred at Waterloo, etc.]' (Prior 1962, p. 13). This fact is particular only insofar as it concerns the earth and sun (which still exist); it is entirely general as concerns the Battle of Waterloo.

\(^1\)He preferred not to talk about events but for my purposes the distinction is immaterial as one can interchange 'events' with 'changes in objects' depending on one's preferred ontology. I prefer an ontology of events (see Katz 1983).

\(^2\)I am switching to fact-talk from sentence-talk to remain faithful to Prior's way of putting things. This move is inconsequential as one can easily replace the locution 'fact about a time t' with 'sentence about a time t' if one prefers not to countenance facts.
But certainly (17) does in fact entail (18). Even if we assume that (17) is (irreducibly) wholly general, i.e. not at all about any particular events, it is nevertheless the case that general facts can only be facts if there are particular facts that make the general facts obtain. For example, someone stole my pencil only if it is the case that some specific individual (we know not who) stole my pencil. So even if (17) is not about some specific past event, it entails a fact about some specific past event in which case Prior's analysis hasn't really eliminated reference to past entities.

Prior's argument against this entailment relation misses the mark. He writes,

If I allege or believe that someone has stolen my pencil, there may be no specific individual with respect to whom I allege or believe that he stole my pencil. There is alleged or believed to be an individual who stole it, but there is no individual who is alleged or believed to have stolen it... So while it is a fact that I allege or believe that someone stole it, there is no fact of the form "I allege (or believe) that X stole it." The one fact that there is, is no doubt an individual fact in so far as it concerns me, but is irreducibly general as far as the thief is concerned (Prior 1962, p. 12, his italics).

The problem here is that Prior is using the opacity of intensional operators such as 'alleges that' to draw conclusions concerning the 'it was the case that' operator which, it seems, is an extensional operator, i.e. it is transparent. Certainly one can believe that someone stole one's pencil without believing of any particular individual that she stole one's pencil. But it cannot be the case that for some specific individual, she stole one's pencil unless some specific individual is such that it is the case that she stole one's pencil. Similarly, it is absurd to suppose that it was the case that for some specific battle, it is occurring while denying that for some specific battle, it was the case that it is occurring.

However, perhaps Prior has something more subtle in mind here. Notice that in sentences such as (17) all events, properties or persons are within the scope of the past tense operator while in (18) something appears outside its scope. Given Prior's presentism, we must assume that it is only within the scope of the 'it was the case that'
operator that non-existents may appear. Anything outside its scope is presumably in the present tense by default and hence ontologically commits us to the existence of something, which for the presentist is the same thing as committing to the presentness of something. But when (18) is uttered, the presentist assumes that e is past and hence does not exist and so cannot satisfy the clause 'for some specific e'. As a result, (18) cannot be true for it requires something past to exist now, which is absurd. But then it follows that (17) does not entail (18) for the former is true, the latter false.

Consider, in comparison, Dummett's argument to the effect that the range of the existential quantifier changes over time so that what one says in two, temporally separated uses of 'there is something in virtue of which . . .' is never the same (Dummett 1969, pp. 373-4). Dummett insists that this is the case even when the existential quantifier is not temporally restricted and, therefore, that this change is reflective of the ever-changing totality of events. It is possible that Prior has something similar in mind, namely, that in order to recognize that the range of quantification over truth conditions changes with time, all things past must be within the scope of a past tense operator; everything else is present tense (unless in the scope of a future tense operator).

One immediate problem with this response is that it still does not explain how a general past tense fact can be a fact since there exists (present tense) no truth maker for it. As noted above, a sentence such as (17) seems to say either that some event did occur or that it was true that some event occurred, and in both cases we need either a past event as a truth maker, or else we are back to verificationism (something Dummett, but not Prior, is happy with). More importantly, notice that in Prior's description of what sentences such as (17) are really about he uses the locution 'which has rolled around the sun so many times since there was . . .'. But the analysis was intended to explain what is meant by past tense phrases such as 'there was a battle', so it cannot, on pain of regress, depend on a prior understanding of such sentences. To say that something has occurred so many times since something else has occurred assumes that past tense speech has been
elucidated, but making sense of past tense sentences is precisely what is at issue. Prior claims that there could be wholly general facts that perhaps are immune to this criticism, but it is surely a serious flaw in the presentist's analysis if she cannot without circularity make sense of claims such as 'the Battle of Waterloo is past'.

Furthermore, presentism cannot adequately explain what it is for an event to be past or future. To be past is to have occurred at a moment of past time, to be future is to occur at a moment of future time. Yet the presentist denies that there are past or future times. Hence there are no temporal moments at which past or future events might be located, so literally nothing is past or future. Is the fact that some sentences are prefixed by an 'it was the case that' operator, and others with an 'it will be the case that' operator sufficient to make sense of the claim that the referents of the sentences themselves are in fact past and future respectively? What is missing is an ontological ground for the claim that events are future and past. It follows from this that if past and future events are unreal, they cannot be temporally ordered (I assume that only what is real can exist in time). But in that case, how is the future distinguished from the past? They each seem to simply be the unreal.

Therefore, finally, presentism cannot render intelligible the notion that time passes from future to present to past. The presentist must presumably admit that events become present successively rather than all at once. But how does one make sense of the notion of succession if the only time available to one's analysis is the present moment? There are no past or future times with respect to which a sequence of events can be ordered. A presentist therefore cannot explain why an event is future before it is present because before must be explained in terms of past or future, which we have just seen cannot be distinguished without the before relation. Hence, the passage of time is left utterly unilluminated. Given these difficulties, presentism is clearly less plausible than tenseless time.
7. Are the Facts Tenseless?

Thomas Baldwin (1998) agrees that tenses can be made coherent by reducing them to relations, though he doubts that this is sufficient to establish the ontological priority of the B-series over the A-series. Baldwin rejects such monadic tense ascriptions as 'Pe' as indeed incoherent. Instead, he prefers to rescue tenses from McTaggart by writing them as two-place predicates such as 'P(e, x)' where x is some event that marks a temporal point of reference. A-series predications differ from those of the B-series, argues Baldwin, in making reference to a speaker's present thought. Letting '#' denote this thought, then 'e is past' is written 'P(e, #)'.

Though 'P(e, #)' amounts to 'e is earlier than #', Baldwin is still able to distinguish the A- and B-series. Since the thought that is present is constantly changing, tenses change even though the temporal relationships between events do not; changes in tense simply reflect the indexical character of 'present' (Baldwin 1998, pp. 3-4). However, since any present thought, #, is itself an entity in the time series, it is clear that temporal relations to it cannot change and hence cannot be the basis of changes in tense (Baldwin 1998, pp. 5-6). Hence, concludes Baldwin, 'tenses depend on temporal relationships between events whose description includes reference as such to one's present thought' (Baldwin 1998, p. 8, my italics). That is, it is the description as 'my present thought' that makes a temporal relation into a tense, and since the description of that very same thought can certainly change (for example, it will be described as 'my past thought' at later times) it follows that tenses can coherently change (Baldwin 1998, pp. 6-7).

Thus far there is nothing in Baldwin's view to make the B-theorist uncomfortable. After all, there are many features of our descriptions of reality that do not correspond to any ontological feature of the world. Hence, the fact that tenses as descriptions are a part of language and thought does not imply that time itself is tensed. But Baldwin thinks that this would be too hasty. Once one admits both tensed and tenseless descriptions as legitimate, one is forced to admit that both types of description can be true (Baldwin
1998, p. 7). For example, one could say that the Battle of Waterloo is earlier than 1999 and one could also say that the Battle of Waterloo is now past, and both claims would be correct on the relational account Baldwin provides. But then the B-theorist cannot claim that reality is tenseless simply on account of the fact that the temporal relations between all events can be given in B-terms, for they can equally well be given in A-terms. If we try to read off the facts from the true descriptions, reality is just as much tensed as it is tenseless. It seems that the A- and B-series are two different descriptions of the tense-neutral facts.

The arguments that I have presented in this chapter constitute my attempt to show that the B-series is indeed the correct description of reality and not simply a different way of talking about the neither-tensed-nor-tenseless facts. Therefore, I shall endeavour to respond to this challenge. The question, as Baldwin acknowledges (Baldwin 1998, p. 11), is not simply whether or not there are two sets of descriptions of the world but whether or not there is any asymmetry between the sets of descriptions that would justify the conclusion that the B-series better captures reality. I believe there is such an asymmetry.¹⁶

Let me first note that if we accept the conclusion of Baldwin's challenge, then time itself could not be observer-independent. Any sequence of events is temporal only if it actually possesses properties corresponding to A- or B-predications, or both. If, however, the timeline itself is neither inherently A-like or B-like, then it follows that it is only temporal in virtue of our descriptions of it. This is an unpalatable conclusion. Surely, time and spatiotemporal entities existed before there were human beings to describe them, continue to exist as they are despite our attempts to describe them, and

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¹⁶Baldwin also thinks that there is such an asymmetry, and I think that our respective formulations are essentially equivalent. However, since I arrived at my way of putting things before I saw Baldwin's solution, I will leave my formulation intact and simply note that there is little in his paper with which I disagree.
will exist in the future even if human beings disappear long before time ends (if indeed time will end). Hence, the time series itself must have either A- or B-properties.

This is the clue we need to sort out the asymmetry between the A- and B-series. Only B-descriptions support the following modal claim: B-relations would still obtain even if human beings did not exist to have thoughts or to describe things. If, for example, $X$ is earlier than $Y$, then it follows that $X$ would be earlier than $Y$ even if nobody existed to think so.\footnote{Unless of course either $X$ or $Y$ is itself a human thought or utterance. But such cases pose no problem and can be ignored here.} This is because, as Baldwin admits, B-relations make no essential reference to descriptions or human thoughts. Hence if a B-description is true, it is not true simply in virtue of being described a certain way; it captures the way the time series is independent of human thought. Since A-descriptions (on Baldwin's account) necessarily refer to a thought described as present, a possible world that lacks such descriptions can indeed contain a B-series but not an A-series. Therefore, the B-series can justifiably claim to be the more fundamental description of time.

Since A-terms depend on the existence of human minds and their various temporal perspectives on the world, it is reasonable to conclude that the A-series characterizes the intensional world and not the external world. This helps to explain why it is so difficult to formulate a version of the A-series that applies objectively to events in themselves. If A-terms are nothing more than relations that B-events have to observers, then it is clear that if one takes the observer out of the equation, and attempts to apply what remains to the events themselves, one is unlikely to succeed.

Take, for example, a subjective predicate like 'fearful'. Suppose that A and B, both of whom have equivalent perceptual abilities, see a dog in a dim alley. A, who was bitten by a dog in the past, views the animal as fearful while B, a lover of dogs, perceives the dog to be friendly. If we refuse to acknowledge the fact that 'fearful' and 'friendly' characterize the way an object's properties seem to an individual, and we try to find a
property in the dog itself that corresponds precisely to these descriptions, then we will be faced with the contradictory result that one and the same dog is intrinsically (and at the same time) both fearful and not fearful. If, however, we admit that 'fearful' is the result of a dog's objective characteristics on the psyche of an observer, we can resolve the contradiction by saying that the dog is fearful-to-A and not-fearful-to-B, which is quite consistent. In rendering tenses coherent by relativizing them to a thinker's temporal perspective, Baldwin has done much the same thing in his paper. He has pointed out that a tenseless world will appear tensed to rational agents (more on this in chapter 5).

8. McTaggart on Time and Change

McTaggart had two reasons for rejecting the B-series as an insufficient description of time. First, he claims that it cannot account for change. Since B-relations are permanent, if they characterize time, then the world doesn't change. But the world does change, so the B-series cannot be the correct theory of time (McTaggart 1921, pp. 12-18). This charge is easily met, for while the B-relations themselves do not change, they can nonetheless represent a changing world. A B-claim such as,

$$(19) \quad (e_1, t_1) \& (\neg e_1, t_2)$$

is indeed always true, but it is a statement of change even though it is not a something that is subject to change. If this is insufficient, then McTaggart's charge amounts to the claim that there can be no single description of the world, no unchanging representation of reality (see Dummett 1960). While such a description may be impossible, this cannot be assumed.

Consider one of McTaggart's more compelling statements,

Let us consider the case of another sort of series. The meridian of Greenwich passes through a series of degrees of latitude. And we can find two points in this series, S and S', such that the proposition "at S the
The point to consider here is that while a line does not change in space and so does not itself change its place, it can perfectly well describe a change of place. For example, if one charts a journey by drawing a line on a map that connects one's various destinations, one has a accurate representation of change of place. Admittedly, the representation itself does not change place (I assume the map is fixed). However, much as spatial change is completely captured by the notion of some object being at different places at different times (which a line may depict), change in time is captured by the notion of different events occupying different times. In other words, it is not necessary that change of a certain kind be subject to that very kind of change.

More important, however, is McTaggart's second charge, that the B-series, in order to be temporal, must have an inherent direction, something that a simple line of moments or events does not have since it is analogous to a spatial line of points (this is what gives the above quotation some bite). McTaggart's claim is that only the moving NOW can be used to define a direction of time and thus turn an atemporal series (he calls it the C-series) into a temporal series (this is of course why he feels the unreality of the A-series is sufficient for the unreality of time). This point is of much greater depth (and shall be one of the topics of Chapter 5). For now let me point out that the B-theorist has two options here: (i) deny that time has a direction and locate the apparent asymmetry of temporal phenomena in some sort of physical processes in time, such as causation or increasing entropy; or (ii) accept that time is qualitatively different from a space in that the timeline has an inherent direction even though it does not move or contain a shifting NOW (this view is recently defended in Oaklander 1984). Furthermore, the A-theorist's attempt to explain the direction of time must not take it for granted that the NOW moves
to later times, for this is just what needs to be explained. Thus, if the A-theorist claims that it is simply a 'rock-bottom peculiarity' (Broad 1959, p. 766) of time that the NOW moves in a particular direction, the B-theorist ought to feel equally justified in claiming that the timeline simply is intrinsically ordered.

9. Conclusion
The arguments of this chapter have shown that attempts to construe the world as ontologically tensed are unpersuasive. This should be sufficient to move us to search for tenseless accounts of the semantics of natural language, freedom and the experience of time. However, for those who would seek to press the case in favour of ontological tense, I argue in the next chapter that one of the most impressive theories of modern physics, Einstein's Special Theory of Relativity, supports the claim that physical time is indeed tenseless time. Therefore, the motivation for a modifying the metaphysical arguments against tense is lacking.
Time and the Special Theory of Relativity

1. Introduction

Hermann Minkowski's famous article 'Space and Time' (Minkowski 1908) has given us the most lasting interpretation of Einstein's Special Theory of Relativity to date, an interpretation that has, by unifying space and time into a single four-dimensional manifold, introduced the phrase Einstein-Minkowski (EM) spacetime into the philosophical lexicon. The purpose of this chapter is to examine the implications for the philosophy of time of Minkowski's theory of spacetime, a theory that I shall argue grounds the possibility of tenseless conceptions of time in physical fact. Though it turns out that the Special Theory of Relativity on its own does not constitute a definitive case against tensed theories of time, it renders it much more difficult to doubt the coherence and plausibility of a tenseless ontology.

2. Einstein and the Special Theory of Relativity

Einstein's Special (or as he called it, 'Restricted') Theory of Relativity (STR) was born of the need to combine two claims that are incompatible in classical physics. On the one hand there is the principle of relativity (POR)\(^1\) which says that all general laws of nature have equivalent descriptions in all inertial (i.e. non-accelerated) reference frames,

\[(POR) \text{ If } S \text{ and } S' \text{ are coordinate systems in relative uniform motion, then the general laws of nature as determined in } S \text{ are the same as determined in } S'.\]

On the other hand, the law of propagation of light (LPL) tells us that light travels (in a

\(^1\)Einstein originally used the phrase 'principle of invariance'.

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vacuum) at a constant rate, \( c = 300,000 \text{ km/s} \),

(LPL) Light travels in a vacuum at the constant rate of \( c \) (regardless of the motion of the light source).

The classical law of velocity additions states that if coordinate systems, \( S \) and \( S' \), are moving in the same direction with velocities \( v \) and \( v' \) respectively, then their relative velocities are given by,

\[
V = v - v'
\]

(if they are moving in opposite directions, their relative velocities should be added in the above equation). If \( S \) is a reference frame moving at the speed of light, and \( S \) and \( S' \) are in a vacuum, then we get,

\[
(1) \quad V = c - v'.
\]

In other words, the relative velocity of \( S \) will be measured by \( S' \) to be less than \( c \), violating (LPL).

In response to this, one could attempt to modify or overthrow one or the other of (POR) or (LPL). One might, for example, wish to deny (POR) in deference to one's commitment to the existence of absolute space (and time). Suppose, then, that there is a preferred reference frame, that of absolute space and time, within which the laws of nature have their most simple and elegant formulations. These formulations are the objectively true descriptions of nature and any deviations from them are to be attributed to one's motion relative to the frame of absolute rest. This view suggests, in sum, that one's motion relative to absolute space will cause one's formulations of the laws of nature to differ. Hence, it should come as no surprise that in some frames the velocity of light differs from \( c \). But if the laws of nature depend on one's motion relative to absolute space, then our descriptions of the physical world will depend on the point in the Earth's
orbit at which we find ourselves. After all, every ninety days or so the Earth's (linear) velocity is rotated by about 90 degrees suggesting that the laws of nature, if (POR) is false, will differ throughout the year. But of course, they don't, so (POR) is true.

Furthermore, even if there is a privileged reference frame, it does not follow that the laws of nature will depend on one's motion relative to it. In classical mechanics, as formulated by Newton, himself a proponent of absolute space and time, it is the case that inertial motions are irrelevant as concerns the laws of nature. Newton admitted that, though we can conclude that absolute space and time exist (via philosophical reflection; recall the famous 'bucket' thought experiment), only relative motions can be detected. Hence, even absolute space and time won't serve to shake a classicalist's commitment to (POR) which, therefore, ought to be adhered to even in the context of preserving a frame of absolute rest. (LPL), on the other hand, is extremely well verified experimentally, and, moreover, the hypothesis that light travels at a constant rate in a vacuum, regardless of the state of motion of the observer is fundamental to Maxwell-Lorentz Electrodynamics (see Einstein 1961).

It is clear, then, that (POR) and (LPL) are here to stay; classical mechanics is the likely casualty and this is where STR enters the landscape. Einstein's solution involved altering the equations by which measurements are transformed from one reference frame to another. If we let $x, y, z,$ and $t$ denote the three spatial coordinates and one temporal coordinate respectively of an event as measured in $S$, and $x', y', z',$ and $t'$ denote the same for $S'$, and we assume that $S'$ is moving relative to $S$ with velocity $v$ along the $x$-axis, then the classical Galilean transformation equations are as follows,

$$
x' = x - vt
$$
$$
y' = y
$$
$$
z' = z
$$
$$
t' = t
$$

I will not discuss the details of the derivation here as many readable accounts exist (see, for example, Arya 1974, ch. 1 or Einstein 1961, pp. 131-8); I will simply summarize the well-known results.
in which, it should be pointed out, the final equation indicates the absolute character of time (i.e. the fact that time is a constant for all reference frames) characteristic of classical mechanics. Einstein's theory replaces these equations with the Lorentz transformations,

\[
\begin{align*}
\begin{aligned}
x' &= \frac{(x - vt)}{\sqrt{1 - v^2/c^2}} \\
y' &= y \\
z' &= z \\
t' &= \frac{(t - vx/c^2)}{\sqrt{1 - v^2/c^2}}
\end{aligned}
\]

which preserve both (LPL) and (POR). Naturally, a modified law of velocity addition arises, namely,

\[
V = \frac{(v + v')}{(1 + vv'/c^2)}
\]

which ensures that nothing can have a relative velocity greater than c.

From these equations follow such well-known and experimentally confirmed results as *Length Contraction* (moving bodies are measured to shrink compared to when they are at rest) and *Time Dilation* (clocks run more slowly when moving than when at rest). Furthermore, it follows that simultaneity is relative, i.e. that there is no absolute notion of simultaneity. To see this, notice that the Lorentz transformation for the time coordinate will assign a value that depends on the motion of the observer. Hence, two events that are determined to be simultaneous in \(S\) will not generally be measured to be simultaneous in \(S'\). Since by (POR) no reference frame is privileged, i.e. there is no sense in which either \(S\) or \(S'\) is the 'right' coordinate system, it follows that simultaneity is frame dependent.\(^3\)

\(^3\)This is not the same thing as saying that whether or not two events are simultaneous is merely a convention as argued, positivistically, by Hans Reichenbach (Reichenbach 1958, pp. 123-43). Rather, the point is that simultaneity is frame relative, but this no more makes simultaneity conventional than does the fact that 'I am left-handed' is true as uttered by me but not by the other members of my family makes it merely a convention that I am left-handed. There are, in other words, as many 'planes of simultaneity' as there are reference frames, but it remains possible that, per reference frame, simultaneity is objectively determinable (Malament 1977, for example, indicates that it is possible to use the relation of causation to define such planes for a given reference frame).
3. Minkowski and the Four-Dimensional World

In classical mechanics, distances and durations are absolute. The length of an object at rest remains unchanged when it moves. Similarly, the temporal interval between two events does not vary with frame of reference. In STR neither of these principles holds true. Length Contraction and Time Dilation indicate that neither distance nor duration is an invariant quantity, i.e. a quantity that is measured to be the same for all observers. Now, it is generally considered necessary that, in order for a physical magnitude to correspond to something objectively real, it must be an invariant quantity (i.e. not observer dependent). Hence, Einstein concluded that it is not strictly correct to view space and time as independently existing entities (Einstein 1961, pp. 62-3). But it should not be concluded from this that physical reality (i.e. the spatiotemporal) is unreal (since merely subjective). On the contrary, physical reality remains quite invariant, but as a four-dimensional structure.

That time and space can no longer be viewed as independently existing entities can be inferred from the above Lorentz transformations. For example,

$$t' = \left(t - \frac{vx}{c^2}\right) / \sqrt{1 - v^2/c^2}$$
$$x' = \left(x - vt\right) / \sqrt{1 - v^2/c^2}$$

clearly indicate that the measurements of spatial and temporal positions depend on each other (notice that the time coordinate, $t'$, depends on the position of the event in $S$ since $x$)

---

1It is important to emphasize the role played by (POR). According to STR, there is no absolute motion or rest since there is no basis upon which to select one frame over another as giving the correct representation of motion/rest. Hence if observers differ in their measurements of space and time, there is no sense in which one is closer to the truth than another, leading to the conclusion that spatial and temporal magnitudes, classically conceived, are not objectively real. Of course, at low relative velocities, relativistic effects are not noticed, and classical mechanics is extremely successful. It is of course possible to attempt to build in some absolute frame of reference, but there is little motivation to do so. For one thing, the Michelson-Morley experiment failed to detect any physical manifestation of such a frame (they could not detect the Ether). Secondly, STR is a well-confirmed, predictively successful theory that stands in no obvious need of supplementation along these lines.
affects the time measurement in $S'$, and that the spatial measurements in $S'$ depend on the
time as measured in $S$). What Minkowski showed was that the mathematical
representation of the physical world as given by STR is the four-dimensional analog of
three-dimensional Euclidean geometry, as we shall see in the following.

Consider two events, $e_1$ and $e_2$, whose spatial and temporal coordinates in frame $S$
are given by $(x_1, y_1, z_1, t_1)$ and $(x_2, y_2, z_2, t_2)$ respectively, while $S'$ measures those events
to be at $(x'_1, y'_1, z'_1, t'_1)$ and $(x'_2, y'_2, z'_2, t'_2)$ respectively. As the Lorentz transformations
tell us, considered independently, spatial distances and temporal intervals between events
will vary from one reference frame to another. For example, $S$ will measure the distance
between $e_1$ and $e_2$ to be

$$s = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

while $S'$ will measure the distance to be

$$s' = \sqrt{(x'_2 - x'_1)^2 + (y'_2 - y'_1)^2 + (z'_2 - z'_1)^2}$$

so that $s$ will not in general equal $s'$. Similarly, the temporal interval as measured by $S$
will be $t_2 - t_1$ which will generally differ from the measurements, $t'_2 - t'_1$, of $S'$.

Surprisingly, however, the spatial and temporal coordinates of events vary so as to
preserve the spacetime interval between the two events. The spacetime interval between
$e_1$ and $e_2$, as measured by $S$, is given by

$$I^2 = dx^2 + dy^2 + dz^2 - (cdt)^2$$

(where $dt = (t_2 - t_1), \ dx = (x_2 - x_1), \ etc.$). Now, as measured by $S'$, the spacetime interval
is given by the analogous

$$I'^2 = dx'^2 + dy'^2 + dz'^2 - (cdt')^2.$$
Remarkably, as Minkowski showed, for any two events and any choice of reference frames, \((2) = (2')\), i.e.,

\[(3) \quad P = I^2.\]

So, while spatial distances and temporal intervals vary from frame to frame, spacetime intervals are \textit{invariant}, they are not frame relative. The upshot, then, is that it is the spacetime interval that is the basic, objective physical magnitude relating events.

So two notable results have been extracted from the work of Einstein and Minkowski. First, space and time as classically conceived are in fact intertwined, making it preferable to talk about a single structure, \textit{spacetime}, as opposed to space and time separately. Secondly, there exists a physical magnitude, the spacetime interval, that relates events and is invariant, i.e. absolute. So the \textit{two} invariant quantities of classical mechanics, spatial distances and temporal intervals, are replaced by a single, integrated but nevertheless invariant structure.

These results can be summarized pictorially on a \textit{Minkowski diagram}, which represents space as one axis of a graph, time as the other axis (it is necessary that we reduce a physical drawing to three dimensions or fewer) and the life of a physical entity as a \textit{worldline} on that graph (i.e. the line that results from joining up the four-dimensional spacetime events that constitute the life of that entity). Figure 2 below is an example of a Minkowski diagram.

Since the speed of light is the limiting speed of the universe, only the events in the 'absolute future' of \(O\) can be causally influenced by \(O\) while those in its 'absolute past' can affect it. These two sections of the Minkowski diagram constitute \(O\)'s light cone. A worldline from \(O\) to \(e_2\) is called \textit{timelike} since for all wordlines within the light cone, \(P < 0\), i.e. the time coordinate 'dominates' the interval as \(c dt^2\) is greater than the sum of \(dx^2\), \(dy^2\) and \(dz^2\). A worldline from \(O\) to \(e_1\) is called \textit{lightlike} since only a light signal from \(O\) could reach \(e_1\); for all lightlike intervals, \(P = 0\). The interval from \(O\) to \(e_3\) is \textit{spacelike}
since \( P^2 > 0 \) (the spatial coordinates dominate). The light cone is divided into an absolute future/past because the events in each will be measured by all reference frames to be

![Figure 2. A Minkowski ('Spacetime') Diagram](image)

later/earlier than \( O \) respectively (though the reference frames will generally disagree as to the magnitude of the temporal relations between \( O \) and events in its light cone). On the other hand, an event in the absolute elsewhere will be measured by some frames to be earlier than \( O \) and in others to be later than \( O \).

4. Some Lessons for the Philosophy of Time

Minkowski called the notion that reality consists of events embedded in four-dimensional continuum the 'postulate of the absolute world (or briefly, the world-postulate)' (Minkowski 1908, p. 83). The universe, as Minkowski conceived of it, consists of the totality of four-dimensional events or as he called them 'world-points': 'The multiplicity of all thinkable \( x, y, z, t \) systems of values we will christen the world' (Minkowski 1908, p. 76, his italics). So the sum-total of worldlines represents reality and, Minkowski suspects, 'physical laws might find their most perfect expression as reciprocal relations between these worldlines' (Minkowski 1908, p. 76).
What is perhaps the most interesting result of Minkowski's work is the remarkable formal similarity it brings to light between spacetime intervals and distances in three-dimensional Euclidean geometry. In Euclidean geometry,

\[(E) \quad dx^2 + dy^2 + dz^2 = dx^2 + dy^2 + dz^2,\]

i.e. spatial intervals are absolute (invariant), something that looks remarkably like the invariance of intervals. Of course, the geometry of EM spacetime is obviously non-Euclidean in that the fourth variable is preceded by a subtraction sign. However, the mathematical similarity between the two is sufficient to have prompted Einstein to comment that '[f]ormally, these four co-ordinates [i.e. of (2) or (2') above] correspond exactly to the three space co-ordinates in Euclidean geometry' (Einstein 1961, p. 63).\(^5\)

Intervals, this suggests, are the four-dimensional analogs of Euclidean distances, world-points the analogs of spatial points in Euclidean space, hence physical reality is a four-dimensional spacetime in which events are objectively related to each other in much the same way as are locations in classical mechanics: 'we can regard the space-time continuum--in accordance with the special theory of relativity--as a "Euclidean" four-dimensional continuum' (Einstein 1961, p. 103).\(^6\)

That spacetime is not precisely Euclidean is nonetheless significant (we can ignore the fact that \(dt^2\) is multiplied by \(c\) since this is simply a constant value that doesn't effect the geometry in any meaningful way). For one thing, that \(c dt^2\) is subtracted from rather than added to the interval forces us to distinguish timelike, spacelike and lightlike

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\(^5\)Putnam writes, 'We have learned that we live in a four-dimensional and not a three-dimensional world, and that space and time--or, better, space-like and time-like separations--are just two aspects of a single four-dimensional continuum with a peculiar metric which sometimes permits distance \((y, x) = 0\) even when \(x \neq y'\) (1967, p. 247).

\(^6\)Of course, when Einstein extended his work to accelerated coordinate frames in his General Theory of Relativity, it turns out that the geometry of spacetime is even further removed from that of Euclid (i.e. it is curved as opposed to flat). However, this is a generalization of STR (from a consideration of inertial systems to a consideration which includes accelerated systems) not a contradiction of it and Einstein credits the work of Minkowski on STR with enabling him to develop the General theory further than would otherwise have been likely (Einstein 1961, p. 63).
intervals. The difference in sign before the spatial and temporal coordinates guarantees that intervals can have positive and negative as well as null values. Otherwise intervals could only have positive magnitudes or else be equal to zero. There would then be no objective distinction between spacetime regions; spacetime would be homogenous (since null values, in this hypothetical case, wouldn't naturally be interpreted as a boundary of any sort, they would not likely be considered a separate kind of interval, though even if they were, spacetime would clearly not break up along the lines needed for absolute past, absolute future and absolute elsewhere). A Euclidean space, on the other hand, is quite homogenous. The classical distinction between space and time has been replaced by the distinction between timelike and spacelike intervals.

Secondly, it was noted above that an event's light cone defines the region of spacetime that it can causally influence and be influenced by respectively. Since the events in the light cone are determinate with respect to time order, the separation of spacetime into timelike and spacelike intervals provides an objective basis for the preservation of causal order, i.e. it ensures that no reference frame will observe an effect prior to a cause. Notice further that events with timelike separation can never be simultaneous for if $dt_2 = 0$, then $P = dx^2 + dy^2 + dz^2 > 0$ which is impossible since $P < 0$ for all timelike intervals. Events with timelike separation can however be measured to be in the same place for if $dx^2 + dy^2 + dz^2 = 0$, then $P = -ct^2 < 0$. This entails that causes and effects are not simultaneous (again assuming that $c$ is the limiting speed of the universe). Similarly, events with spacelike separation can be measured to be simultaneous ($P = dx^2 + dy^2 + dz^2 > 0$) but not in the same place for if $dx^2 + dy^2 + dz^2 = 0$, then $P = -ct^2 < 0$ (see Mellor 1998, pp. 55-6).

Finally, these differences between the temporal and spatial variables in STR can be taken advantage of as a physical ground for the explanation of why our experience breaks reality up into three homogeneous spatial dimensions and one, separate time
dimension. All things considered, then, it is clear that STR does not make time just like (Euclidean) space.\(^7\)

However, STR clearly makes time more spacelike than previously thought in the sense that there is nothing in the formal treatment of spacetime that corresponds to the ontological distinctions between the tenses. The formalization includes a variable for time, and within any reference frame time forms a strict linear ordering (since it maps onto the real numbers), but nothing corresponds to the moving NOW or the present moment in the mathematical treatment of the physical world. In this respect the timeline resembles a spatial dimension and spacetime is very much a four-dimensional analog of a Euclidean space. Einstein writes,

Inertial spaces, with their associated times, are only privileged\(^8\) four-dimensional co-ordinate systems that are linked together by the linear Lorentz transformations. Since there exist in this four-dimensional structure no longer any sections which represent "now" objectively, the concepts of happening and becoming are . . . complicated. It appears therefore more natural to think of physical reality as a four-dimensional existence, instead of, as hitherto, the evolution of a three-dimensional existence (Einstein 1961, p. 171).

This is as close as one could imagine a physicist coming to describing McTaggart's B-series. While McTaggart rejected the B-series as an inadequate theory of time, it is the conception suggested by physics. STR implies that the physical universe is the Minkowski world, a 'static' structure in which all events, past, present and future, are spread out within four-dimensional spacetime. Much as the tenseless theory of time suggests, tense is ontologically insignificant. No event (world-point) can be more or less real in relation to the NOW or the flow of time since there is no objective present or

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\(^7\)Mellor (1998, pp. 47-57) and Christensen (1993) put forth sustained attacks on the claim that STR makes time just like space.

\(^8\)By 'privileged' Einstein is here simply asserting that a given reference frame is of particular interest to an observer in that frame, i.e. it represents the observer's subjective perspective on reality. He is not implying that each frame is 'objectively correct' or the like.
becoming that could mark off the real (determinate) from the unreal (indeterminate). At least, this is the story so far as the mathematical formalization of STR is concerned.

Now I think that it is a very good policy to allow our ontology to be informed by physics: physics is certainly amongst the best ways available for learning about the physical world, so its theories and results are ontologically significant. Given this stance, we can take STR's claim that there is no mathematico-physical need for an ontological distinction, drawn along tense lines, between events to suggest, as the B-theorist would have it, that every event exists tenselessly (i.e. permanently) at its four-dimensional world point.

To claim that the Minkowski-world, the universe as a whole, is a static structure is simply to claim that, from the four-dimensional point of view, the universe is the sum-total of events. It is not a becoming of events, or an evolution of three-dimensional entities, but simply the four-dimensional structure that has often (though misleadingly) been called the 'block universe' by philosophers. We now know that space and time form a unified whole that cannot be objectively separated as, for example, Newton would have had it. It is four-dimensional spacetime intervals (worldlines) that define the physical world, yet they are not the sort of entities that evolve or change in time since they include the temporal dimension in their own mathematical specification. In other words, it would be improper to view worldlines as the sort of entities that grow or change in time. To represent this would require a series of spacetime diagrams, each of which represents a particular worldline as longer than in the last (see also Lockwood 1989, pp. 261-3). But since each diagram includes time as one of its axes, this sequence of spacetime diagrams would have to be embedded in a second time dimension, a supertime that contains the sequence of regular timelines. This can be seen (figure 3) by the fact that the drawing of such a series of diagrams would have to be spread out in space along a piece of paper or

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9Hence, any attempt to define becoming or the flow of time as a temporal feature of three-dimensional reality will have pressure put on it by STR.
chalkboard; this physical separation corresponds to extension in supertime (the same applies to any conception of dynamic time whereby our consciousness 'crawls along' the worldline; each successive position of our consciousness would require a separate diagram).

But there is no reason to believe in supertime. In particular, no physical theory to date has required the postulation of a second time dimension. What's more, this line of reasoning suggests an infinite regress. Supertime was introduced in order to make the

![Figure 3. A sequence of spacetime diagrams that is intended to capture the dynamic features of time (a), in fact suggests (b), a higher order static structure of supertime (with $X$ representing the extra time dimension)](image)

static worldline dynamic, i.e. to turn it into something that is not in fact unchanging because it differs as a whole at different times. Since a worldline is static in four-dimensional spacetime, a fifth-dimension was posited in order to have something against which the worldline could be conceived as dynamic. But of course the dynamic
worldline can be represented by means of a spacetime-supertime diagram, one that has two time dimensions (figure 3b). But now, from the five-dimensional perspective, a collection of four-dimensional worldlines is very much a static entity, one that does not seem to capture the dynamic features of time after all. Hence, a super-supertime would presumably be needed against which the five-dimensional collection of four-dimensional worldlines can grow, if it is to capture the essence of time. But, the six-dimensional collection of collections of worldlines is static, and hence can't capture the dynamic features of time, and so on *ad infinitum*. On the other hand, if the five-dimensional picture is adequate, then it is hard to see why the four-dimensional picture wouldn't be; to stop at five dimensions would be *ad hoc*.

The moral of this story is that we ought to resist the temptation to move to higher-order conceptions of the world for it is only by refusing to accept a Minkowski diagram as sufficient that the regress gets off the ground. Time is the dimension against which change is measured, but time itself does not change, nor does the universe grow by 'accretion of facts', as Broad argued. Events are simply spread out in time as locations are in space. Perhaps the resistance to accepting the Minkowski diagram as an adequate representation of the world comes from intuitions such as McTaggart's that the only sufficient representation of time is one that *itself* reflects its dynamic element, but this has already been shown (chapter 1) to be an inconclusive argument (I will address some related issues in chapter 5).

It is significant that the Minkowski view of reality should come from physics. Some philosophers have argued that tenseless time is an incoherent merely philosophical theory that illicitly tries to extend our temporal concepts beyond their legitimate usage. The idea is that our language and experience are and must be tensed (which I admit, see

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10Lockwood 1989, p. 262 defines a 'super worldline' by joining together the tips of the various, incomplete worldlines embedded in supertime. This helps draw out the relevant similarity between the Minkowski world and the world of supertime.
chapters 3 and 5), so we cannot (and therefore should not) conceive of time itself in any other way, no matter what the physicists or philosophers of physics have to say. Consider the following passage in support of such a claim,

It needs to be remembered that the B-theory is a philosophical theory, not a scientific one, so it is not a question of creating a mathematical model which may be far removed from our common understanding, but which nevertheless enables us to make successful predictions. This is still the case, even though some philosophers have argued that there are close links between the B-theory and physical theories of space-time. A metaphysical theory aspires to a greater scope than a scientific one (Rudd 1997, p. 254).

The point concerning metaphysics is true; it does aspire to greater scope than physics since it tries to do things such as unify the concepts of physics, philosophy and common sense; inquire into interpretive assumptions at the base of our understanding of physical theories; and so on. However, it was no predisposition on Einstein's part that lead him from STR to a tenseless account of reality. Indeed, he was quite bothered by the tenseless view of time and despite his conviction that physics supported it, he was never quite able to accept it philosophically.\(^\text{11}\) Hence, his words (two quotations above) should not to be taken lightly but, rather, as a serious indication of the compelling naturalness of the move from Minkowski's work on STR to a tenseless worldview. So while the tenseless theory of time is certainly a philosophical theory, it would not be misleading to say that the currently best theory of space and time is a tenseless theory insofar as it makes no provision for tense and, therefore, that physics supports this particular philosophical outlook.

Rudd is correct to claim that the tenseless theory of time is not a physical theory, i.e. it is not a modification of or alternative to STR that can be tested for predictive power; we cannot, by eliminating tense from physics, gain more accurate predictions or

\(^{11}\) Once Einstein said that the problem of the Now worried him seriously. He explained that the experience of the Now means something special for man, something essentially different from the past and the future, but that this important difference does not and cannot occur within physics . . . this . . . seemed to him a matter of painful but inevitable resignation' (Carnap 1963, p. 37).
discover a more elegant mathematical formulation of STR than currently available. But this is because tense does not make an appearance in STR's formalization; there is no variable for it in the Lorentz transformations or the spacetime interval. This in itself is extremely significant since a theory that makes no provision for tense, has no variable or formula corresponding to such an ontological feature of our universe, remains the most successful physical theory of space and time to date, a theory that is experimentally confirmed to a high degree as well as mathematically elegant (under Minkowski's formulation in particular). It would seem likely that, were tense a feature of the physical world, a theory of spacetime that makes no attempt to treat it explicitly would run up against some important failures. After all, it is not as if tense is supposed to be a particularly remote entity; rather, it is taken to be a prominent feature of all physical events, one that can be directly experienced. Nevertheless, STR continues to be applied without trouble. Combine this with the formal similarity of STR and Euclidean geometry and we have a very strong case for not only the conceivability and possibility but also the reality of B-time.

In moving from the results of a physical theory to a philosophical conclusion, one opens up room for philosophical criticism. However, scientific concepts regularly extend and alter our common sense conceptions and this move is often perfectly legitimate. For example, when physics taught us that temperature is in fact mean kinetic molecular energy or that weight is the result of a gravitational force and therefore not constant, our common sense concepts temperature and weight were altered. Or, to take a more controversial example, it is commonly argued that science has taught us something about colour that is not a part of our everyday concept, namely that it is a subjective feature of perceptual experience, not an objective property of physical objects. The point is that

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12 Though not by Rudd who argues that time is merely subjective.
13 Of course this conclusion remains controversial. For a vigorous defense, see Boghossian and Velleman (1989).
using physical theory as grounds for drawing philosophical conclusions that strain or even contradict common sense is a legitimate exercise, especially when one can explain why experience seems to contradict the physical theory (see chapter 5).

One important, philosophically relevant function of mathematics is that it allows us to represent and reason about geometric spaces that cannot be visualized in any more than a metaphorical way. Similarly, languages of formal logic allow us to evaluate arguments that cannot be easily grasped, if grasped at all, in natural language. The great power of languages, formal or otherwise, is their ability to extend cognition beyond our subjective experiences of the world. Mathematics in particular is one of the most powerful and reliable tools we have for examining aspects of the world that are experientially elusive, though of course we are neither perfect in our mathematical reasoning nor infallible in drawing philosophical conclusions from mathematics (or physics). Nevertheless, employing mathematical and physical theories to update or replace common sense ideas remains viable since, it is plausible to claim, common sense notions are themselves simply rough and ready generalizations confirmed by relatively unsophisticated interactions with the world and so are subject to revision as much as any scientific concepts.

Therefore, STR not only supports the B-view, but it also helps motivate the search for a theoretically sound elucidation of tenseless time, i.e. one that can respond to the philosophical objections raised against it. After all, one of the ways to put a physical worldview to the test is to examine its philosophical soundness and there is no reason to shirk this responsibility in the case of tenseless time. The formal similarities between four-dimensional spacetime and Euclidean space, and STR's success despite its lack of treatment of the NOW are striking enough results to make this philosophical task one worth pursuing. The upshot is that the four-dimensional, static universe is neither philosophical rambling nor 'illegitimate metaphysics'; it is an ontology with significant support from physics.
5. Time and Physical Geometry

There is a well-known line of argument that is intended to show that STR is in fact inconsistent with any view of time that ascribes differences in ontological status to events based on their temporal locations. One of the earliest formulations of this sort of argument is due to Hilary Putnam (1967) whose reasoning runs as follows. Consider two observers, $O$ and $O^*$, who are in motion relative to each other and who have a spacelike separation from each other. $O$ measures an event, $n$, to be present (i.e., simultaneous with the measurement) while $O^*$ measures event $e$ to be present. It is generally possible that $O$ and $O^*$ are moving such that $O$ would also consider $e$ to be present, i.e. to lie along her hyperplane of simultaneity. Now consider some event, $e'$, that is simultaneous with $e$ in $O^*$'s frame of reference but lies in the absolute future in $O$'s frame of reference (see figure 4). If we assume, as do most tensed theories of time, that what is 'present' is real, then $O$ must admit that $e$ is real (assuming that that which is simultaneous with the present is itself present, hardly a controversial premise). But since

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$^{14}$A similar argument is due to Rietdijk (1966) whose title is unfortunate since the issue is whether or not the future is determinate, not whether or not it is determined; these are separate disputes (see chapter 4).

$^{15}$O's three-dimensional hyperplane of simultaneity can be defined within $O$ even for events with spacelike separation (see, for example, Malament 1977).
e is simultaneous with e', as even O would calculate, it follows that O must also admit that e' is real. Therefore, the future cannot be indeterminate since there will always be a possible reference frame with respect to which events are present or past that are future for another observer. Recall that the Principle of Relativity asserts that we cannot single out either O or O* as a privileged frame of reference, so it is illegitimate to say that the event in question is 'really' indeterminate because in O's future.

Most of the assumptions in this argument are innocuous enough. Notably, however, Putnam does rely on the claim that is determinate (real) with respect to is a transitive relation, i.e. that if x is determinate with respect to y, and y is determinate with respect to z, then x is determinate with respect to z (Putnam 1967, pp. 242-3). This claim also seems reasonable. If, according to my frame of reference, some distant event, e, is present because it lies along my hyperplane of simultaneity and, also according to my frame of reference, an event, e', in my absolute future lies along the hyperplane of simultaneity of an observer for whom e is present, it seems strange to conclude that, nevertheless, e' is indeterminate (again employing the common assumption that whatever is present is real). I have, after all, no reason to favour my reference frame over the other (i.e. I have no reason to consider my perspective to be of unique physical significance).

Nonetheless, the transitivity claim has been disputed. Howard Stein, for example, has argued that it is formally consistent with STR to assert that only those events that lie on or in one's past light cone are determinately real and that all other events, those in the absolute future and in the absolute elsewhere, are indeterminate (Stein 1991, pp. 148-50). In this way one can accommodate a tensed ontology within the framework of STR. Nicholas Maxwell, on the other hand, disagrees, arguing that such a view suggests that O would have to consider the event she currently observes to be ontologically indeterminate. After all, if e is indeterminate with respect to O owing to their spacelike separation, then O is committed to the admission that n is indeterminate with respect to
$O^*$. Consistency, therefore, demands that $O$ admit that her current experience is indeterminate, which is absurd (Maxwell 1985, pp. 27-8).\(^{16}\) Stein replies,

Maxwell assumes that the relation ",x and y are indefinite for each other" is transitive . . . I see no compelling grounds for such an assumption; and against it, I see what seems to me a most compelling reason: that it renders the notion of becoming incompatible with the special theory of relativity (Stein 1991, p. 151).

He goes further and argues that it is illegitimate in the context of STR to view the 'present' as a hyperplane of spacetime, i.e. a three-dimensional space, for this assumes that distant events that lie on this hyperplane are actual. He thinks that this assumption is not within the spirit of STR (Stein 1991, pp. 151-2). In effect, Stein views three-dimensional hyperplanes as mere geometric artefacts and he restricts determinacy to what lies in or on the past light cone of a spacetime point.

A number of things stand out in Stein's position. First, confining ourselves to a given reference frame, Stein's tensed view entails that events in the very distant past become real as time flows since the past light cone of a later event is larger than that of an earlier event. Many A-theorists (such as Tooley 1994) find this sort of conception of temporal passage unpalatable (Tooley wants to use 'becoming' to capture the notion that events become real by becoming present). Secondly, Maxwell does have a point; Stein's proposal seems ad hoc. Events that just happen to be at a very large spacetime separation from myself ought not for that reason be considered ontologically indeterminate. Why should my spatiotemporal position have such ontological significance? Why, furthermore, ought we to believe that a distant observer lives (quite literally) in a different reality? A distant observer will, on Stein's view, quite correctly carve up the ontological universe very differently from ourselves. Now Lawrence Sklar (1981) has argued that

\(^{16}\)This assumes that there could exist at least one observer with spacelike separation from $O$, which is reasonable (unless $O$ is the only thing which exists in the universe, a proposal I will discount). It is also worth stressing yet again that it also assumes, in concert with STR, that all reference frames are equally legitimate with regard to their descriptions of reality.
anyone who wishes to deny the reality of the *temporally* 'distant' must deny the reality of the *spatially* distant as STR has put space and time on equal footing. However, one might just as well follow the B-theorist and affirm the determinate status of the temporally distant given the implausibility of the alternative, an alternative which amounts to solipsism of the present and local past.

Others who have tried to show that the passage of time, or the reality of tense, is compatible with STR include Dieks 1988, McCall 1994, Prior 1970, Rakic 1997, Smith 1993, pp. 225-5, and Tooley1997, pp. 335-71. I think it is likely that some reconciliation along these lines could be made logically *consistent* even if it lacks plausibility due to its reliance on some troubling claims (such as Stein's denial of the reality of the spatially distant). However, what I wish to question here is the motivation for the attempt: why bother modifying Minkowski's simple and elegant interpretation of Einstein's work, one that was Einstein's preferred view? Why should we be concerned, as Stein is, with making the notion of becoming compatible with STR? Since physics at least *prima facie* counts against ontological tense, the reasons for making ontological space for it must come from elsewhere, from some philosophical or pre-theoretic intuitions we have concerning the ontological asymmetry of past and future.

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17Prior suggests that STR is only an epistemic theory, a theory of measurement results and has no significant bearing on the ontological question of the nature of time itself. Smith follows Prior in this, arguing that STR is a theory 'about the observable behaviour of light rays, rigid bodies, and the like' but is not 'a theory about time' (1993, p. 229). Hence they defend what has been taken by many (for example, Lockwood 1989, p. 9) to be the one theory of time that STR definitively rules out, namely one that relies on their being an 'absolute' moment of presentness, a unique NOW that defines the real. STR's commitment to the non-absoluteness of simultaneity has generally been taken to be incompatible with such a view. If, on the other hand, one is prepared to relegate the results of STR to the epistemic, then even an absolute NOW can be reconciled with STR. However, as I shall argue below, such effort is only worthwhile if one can show the need to modify our understanding of STR, and such a demonstration runs squarely up against the strong case for tenseless accounts of time. Thus, the philosophical motivation for a view like Prior's is missing. Rakic, on the other hand, argues that we ought to admit that STR is indeed a theory about time but that it is possible to accommodate the features of time brought to light by STR within an 'open future' ontology. So there is more than one way to combine a tensed ontology with the results of STR. None, however, is needed.
So the motivation for reconciling tense and STR is familiar, namely, the belief in the ontological reality of tense. Accordingly, so long as a tenseless view of time is workable, and can respond to the philosophical objections raised against it, then it would be pointless to attempt to modify our understanding of EM spacetime to accommodate tense. We have, however, already seen that the coherence of tense is subject to profound doubt (chapter 1). Furthermore, I argue below (chapters 3-5) that tenseless time is philosophically workable in that it possesses the resources to respond to the objections raised against it. So STR can truly be taken as support for a tenseless ontology and we can legitimately sidestep the debate over the consistency of becoming and STR as well as associated questions such as the transitivity of is determinate with respect to. Since there is no compelling philosophical reason to believe in tense, there is no reason to engage in the attempt to reconcile it with STR and we can, therefore, take the latter at face value.

That STR has not settled the philosophical disputes over the nature of time once and for all is not surprising. There are indeed metaphysical assumptions that go into conscripting physical theories for philosophical ends. Scientific theories tend to need some interpretation, which is where philosophy gets its foothold in science. To paraphrase Sklar, one only gets about as much metaphysics out of a physical theory as one puts in (Sklar 1981, pp. 291-2). While it would be beyond the scope of this chapter to examine in detail the relationship between physics and metaphysics, it is clear that the interpretation necessary for drawing philosophical conclusions from STR will grant philosophers the elbow room required for attempted reconciliations of tensed theories of time with physics. However, as far as philosophy is concerned, what matters most is the impulse to make this effort. If there is none, then the appropriate course of action is to

\[18\text{Putnam is overly optimistic: 'I conclude that the problem of the reality and the determinateness of future events is now solved. Moreover, it is solved by physics and not by philosophy... I do not believe that there are any more philosophical problems about Time' (1967, p. 247, Putnam's italics). That the optimism is too strong is attested to by the fact that Putnam himself has rejected the arguments of his earlier paper (personal communication).} \]
adhere to the simple, elegant conception of reality suggested by Einstein and Minkowski. As tenseless time is philosophically preferable to tensed time, the right course is apparent.

6. The B-series and Relative Time

It has been argued that rather than suggesting B-series time, STR actually counts against it. Though mistaken, it is worth considering this argument before concluding. As noted above, STR renders temporal relations frame dependent. Hence, there will in effect be a plurality of B-series, each one corresponding to a frame of reference. But the B-series view of time assumes that the future is on an ontological par with the past and present and that, consequently, one can refer to future events and that all propositions, even those in the future tense, have determinate truth values. At least one philosopher has reached the conclusion that the B-series view of time therefore requires that 'there is a single universal temporal reality that guarantees the possibility of referring to events occurring at arbitrarily different times', and therefore that it 'assumes some kind of absolute uniqueness and homogeneity of time' (Pauri 1997, p. 273, his italics), which is of course precisely what STR denies.

It's not clear why Pauri thinks that the possibility of referring to events at arbitrary times requires absolute time (he states it as if it follows transparently from the tenseless view), but the thought behind it is probably something like the following. Different observers, in order to count as referring to one and the same event, must be able to agree on the temporal specification of that event. But if there is no absolute time to determine a unique temporal position for all events, two observers in relative motion cannot refer to the same event because (i) the temporal specification of the event will in general differ for each observer and (ii) since we cannot single out one observer as privileged or absolute, there is no way to determine the correct description of the event (there is nothing to appeal to outside of the two reference frames). Therefore, there is in general no criterion
for reference to a given event as there is nothing to decide the case between the two
descriptions.

However, such an argument would only be telling if the various descriptions that
observers in relative motion come up with would turn out, in general, to conflict, i.e. to
contradict each other. But the Lorentz transformations allow us to determine when two
different descriptions are in fact of the same event. Hence, descriptions that differ in their
temporal assignments can be equivalent in the sense of mapping onto each other via the
Lorentz equations. Indeed, the Lorentz transformations provide a criterion for the
physical equivalence of two descriptions of an event: if a description maps onto another
via these transformations, then they are equivalent for the purposes of physics. Since
time is an observer-dependent phenomenon, a given event will, as regards time, be
described differently across frames of reference. But the significance of this is that there
is more than one way to describe the (four dimensional) world. What's more, there is no
reason to believe that it is necessary that two descriptions be identical in order for each to
refer to the same entity. In fact, there is good reason to deny it (see Kripke 1980, Putnam
1975). Thus, the B-theorist need not posit absolute time in order to secure successful acts
of reference to future events.  

That different observers carve up spacetime intervals differently is simply a result
of the fact that each has a different perspective on the four-dimensional world.
Nonetheless, it can be one and the same thing (world) upon which they have their
differing perspectives. Consider, in comparison, the case of indexical sentences. A
speaker in 1899 can refer to 1999 by way of the phrase 'a hundred years from now'; a
speaker in 2099 can refer to the same year using the phrase 'a hundred years ago'.  
Our knowledge of the semantics of indexicals allows us to determine when different speakers

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19 The B-theorist could, alternatively, deny the possibility of referring to future events (except for those
whose causal antecedents have been observed). This would undercut Pauri's argument.
20 Indeed, if they each want to refer to 1999 by means of its relation to their respective moments of speaking,
then they must use different descriptions.
refer to the same year. Similarly, the Lorentz transformations enable us to determine how different coordinate systems will differ in their measurements, hence we can use them to determine whether or not two observers refer to the same event. In sum, the fact that different frames differ with respect to \textit{when} they place an event is insufficient to show that they do not each refer to the same event, so Pauri's argument is inconclusive.

Finally, let me note that the B-theorist can happily commit to a multiplicity of time-series so long as each can be specified tenselessly. In other words, the B-theorist can accept that temporal specifications are frame relative and rest content with the fact that no frame requires objective tenses to explain its time sequence. It is simply easier for the purposes of philosophical elucidation to confine oneself to discussion of a single reference frame even though this could give the misleading impression that the B-series view assumes there is one absolute time.

7. Conclusion

Thanks to the work of Einstein and Minkowski, the philosopher is presented with some powerful reasons for believing in a tenseless ontology. EM spacetime is a theory of the world that has no room for tense yet is securely grounded in solid physical theory and strongly confirmed by experimental tests. While the appeal to STR as interpreted by Minkowski does not logically preclude alternative philosophical conceptions of the nature of time, it informs the philosophical debate by developing a worldview that many, such as McTaggart and Prior, have thought to be impossible. The tenseless theorist can feel confident that she is, in defending tenseless time philosophically, working towards a position that will cohere nicely with some of the most impressive physics of all time. So STR not only motivates the search for a philosophically sound, tenseless account of time, it provides a destination, a metaphysics for the philosopher of tenseless time to strive towards. The tenseless theory of time finds itself in that fine philosophical tradition of
being inspired by the best science of its day while aiding it as it seeks to work out its broader implications.
Tense and Temporal Semantics

1. Introduction

Quentin Smith is one of the most able contemporary defenders of tensed time and has perhaps done more than anyone in raising new semantic challenges to tenseless accounts. Of note is his recent charge that D. H. Mellor's popular, tenseless theory of time cannot coherently explain the need for tensed sentences in our language. In what follows I argue that this charge cannot be sustained as it rests on a confusion. A similar confusion underpins Smith's further argument to the effect that no tenseless theory of time can account for obviously valid entailment relations between tensed sentences. Drawing on the work of J. J. C. Smart and the direct theory of indexical reference, I propose a schema for tenselessly analyzing tensed entailment relations. Finally, I examine Smith's attack on direct theories of reference and find it to be inconclusive at best. I conclude that tenseless theories of time are not threatened by the linguistic facts.

2. The New Tenseless Theory of Time and Truth Conditions

Early defenders of the tenseless theory of time argued that all tensed sentences can be translated into tenseless sentences without loss of content (Russell 1903, Smart 1963). In recent years, however, there has been wide-spread agreement that tensed sentences, particularly those containing temporal indexicals, cannot be eliminated from language. Much of this consensus is inspired by the work of John Perry who has argued persuasively that certain beliefs are essentially indexical, i.e. that the cognitive significance of certain beliefs requires that they be irreducibly indexical in character. This includes beliefs about our relations to time (Perry 1979). 'New' tenseless theories of
time, such as Mellor's, accept the consequences of this claim, and have willingly taken on
the challenge of explaining, in terms consistent with a tenseless ontology, both the
semantics of temporal indexicals and our need for these indexicals.

It will be helpful here to review Mellor's core arguments. Consider a token of,

(1) The movie starts now

said of a movie that begins at 1:00 p.m. (1) is true, Mellor argues, if, and only if, it is
uttered at 1:00 p.m. (that is, if the utterance is simultaneous with the start of the movie),
and this is all that one asserts upon uttering (1). So, on this account, the truth condition of
(1) is given by,

(2) (1) is uttered at 1:00 p.m.,'

which is an entirely tenseless truth condition, consisting of only a sentence token, a time
and the relation of simultaneity (Mellor 1981, pp. 73-88).

If (2) is true, then it is true at all times. Therefore, the belief that (1) is uttered at
1:00 p.m. cannot by itself move one to enter the theater at 1:00 p.m. rather than any other
time. However, the tensed belief that the movie starts now, or that it is now 1:00 p.m.,
will, if it is held at 1:00 p.m., cause one to enter the theater at the right time (more on this
in chapter 5). Hence, Mellor concludes, though objective reality is tenseless (since tensed
sentences have only tenseless, token-reflexive truth conditions), psychological reality is
tensed for we need beliefs whose truth values change with time, and this is precisely what
tensed beliefs do. It follows that it is impossible to eliminate all tensed sentences in
favour of tenseless translations if language is to continue as a useful tool in our
interactions with the world (Mellor 1981, pp. 89-102).

'Note that (2) should really read '(1) is uttered at 1:00 p.m. and 1:00 p.m. is when the movie starts'.
However, since I have assumed we are talking about a movie that begins at 1:00 p.m., I have left the second
conjunct implicit.
Smith objects to this account for two reasons. First, he argues that it is inconsistent to maintain both that (2) completely specifies the truth condition of (1) and that temporal indexicals are nevertheless needed in language. Second, he argues that certain inferential relationships between tensed sentences can be captured neither by Mellor's token-reflexive account nor any tenseless theory on the market. I will take up these criticisms in turn.

3. Tense, Truth Conditions and Translation

Mellor combines the claim that (2) completely specifies the truth condition of (1) with the claims that a token of (2) is true any time it is uttered and that a token of (1) is true if and only if uttered at 1:00 p.m. But, Smith objects, how can two sentences that 'state the same fact' differ in this way? This violates what Smith calls the principle of the identity of truth conditions,

\[(\text{PITC}) \text{ If two tokens of the same sentence or two tokens of different sentences state the same fact, } F_1, \text{ they have the same truth conditions, i.e. are true iff } F_1 \text{ and every fact implied by } F_1 \text{ exists (Smith 1987, p. 377).}\]

(PITC) follows from the claims (endorsed by Mellor) that (i) facts are what make sentences true and (ii), if a sentence token states a given fact, $F_1$, the token is true if and only if $F_1$ and every fact implied by $F_1$ exists (Smith 1987, p. 376). In other words, there can be no difference in the truth conditions of two sentences that 'state the same fact'.

But (1) and (2) do differ in their truth conditions since (1) is true if and only if it is tokened at 1:00 p.m. while tokens of (2) are always true. Hence, Smith concludes that (1) and (2) cannot state the same fact.

Smith suggests that the only way for Mellor to resolve this difficulty is to concede that tokens of (1) and (2) have the same truth condition. Indeed, Smith argues that,

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1I am not committing to any substantial understanding of facts. I am simply using the phrase of Smith and Mellor. I consider facts to simply be truth conditions, but nothing here rests on the issue.
construed tenselessly, (1) and (2) do have the same truth condition since they are each made true by the same fact, i.e. the fact that (1) occurs at 1:00 p.m. Mellor might think that (1) and (2) have different truth conditions, Smith continues, because the fact that (1) occurs at 1:00 p.m. is a fact that is about a token of (1), not about any token of (2). Therefore, only occurrences of (1) are restricted by the fact statement while occurrences of (2) are left unaffected. However, Smith points out, this has the effect of reducing Mellor's theory to the old tenseless theory of time, which insists on the eliminability of tensed sentences,

Mellor's only grounds for holding that tokens of tensed sentences cannot be translated by tokens of tenseless sentences are that these tokens have different truth conditions, and once these truth conditions are seen to be the same, Mellor is deprived of his reasons for subscribing to the thesis of the new theory that tensed tokens are untranslatable (Smith 1987, p. 378).

Thus Smith concludes that the only way to rescue Mellor's theory is to reduce it to a position that Perry and others have shown to be untenable.

However, Smith's argument rests on a confusion. Mellor is concerned with the truth condition of a dated, particular utterance of (1); that is what makes his account token-reflexive. What makes an utterance of (1) true, Mellor contends, is that the movie it refers to starts at the same time as the utterance. We can, of course, utter a sentence token that captures this fact by uttering a token of (2). In other words a token, a dated, particular utterance, of (2) has the same truth condition as the 1:00 p.m. token of (1), namely the simultaneity of the utterance of (1) and the movie.

Now, what does it mean to claim that a token of (1) can be uttered truly only at one time while tokens of (2) can be uttered truly at any time? This simply means that at any time other than 1:00 p.m., a dated, particular utterance of (1) is false, but there are no times at which any utterance of (2) is false. But this does not violate (PITC). (PITC) says that for two tokens to 'state the same fact' they must have the same truth condition.
Therefore, so long as any two sentence tokens have the same truth condition, they state the same fact. And this is surely the case with certain tokens of (1) and (2). It does not matter, so far as (PTTC) is concerned, that there exist other utterance pairs of the same types as (1) and (2) that differ in their truth conditions. In such cases, the two utterances do not state the same fact. For instance, an utterance of (1) that occurs at 1:00 p.m. states a different fact than an utterance of (1) that occurs at 2:00 p.m. What this does not mean, however, is that the token of (1) that occurs at 1:00 p.m. differs in its truth condition from a token of (2) said any time. So, if a dated, particular utterance of (1) shares a truth condition with all utterances of (2), then that token of (1) when conjoined with any of the tokens of (2) forms a pair that satisfies (PTTC).

The truth condition of any particular utterance of (1) never changes. However, different utterances of (1) can indeed differ in their truth conditions since (1) is a sentence type whose tokens can have different truth conditions, while (2) is not such a type. Smith, then, is simply trading on a type/token equivocation in his attack on Mellor.

Mellor's position is that we need tensed sentences (i.e. tensed sentence types) in our language because they are such that their tokens will have different truth values depending on when they are uttered, something that is not true of tenseless sentence types. But, he insists, any particular token has a tenseless truth condition, a different truth condition than that of a later token of the same type. In this way, tensed language is reconciled with tenseless reality.

Consider the textual evidence,

[L]et R be any token of 'Cambridge is here' and S be any token of 'It is now 1980'... Then R is true if and only if it occurs in Cambridge, and S is true if and only if it occurs in 1980. If a sentence giving another's truth conditions means what it does, R should mean the same as 'R occurs in Cambridge' and S should mean the same as 'S occurs in 1980'. But these sentences have different truth conditions. In particular, if true at all, they are true everywhere and at all times' (Mellor 1981, p. 74, italics added).
The highlighted sentence cannot be referring to the token pairs \( R \) and (a Cambridge occurrence of) \('R occurs in Cambridge'\) or \( S \) and (a 1980 occurrence of) \('S occurs in 1980'\).

For one thing, Mellor \textit{insists} that the latter in each of these pairs gives the truth condition of the former, so that the tokens in each pair have the same truth condition (Mellor 1981, pp. 40-42). Secondly, how can a token, a dated particular, be true at all times or at all places? A token is a temporally and spatially localized event. The type can be true at all times, but this simply means that tokens of that type can be truly uttered at any time, as Mellor goes on to write,

\begin{quote}
You need not be in Cambridge in 1980 to meet true tokens of \('R occurs in Cambridge'\) and \('S occurs in 1980'\). But you do need to be in Cambridge in 1980 to meet the true tokens \( R \) and \( S \) . . . At all other places and times those tensed sentences would have been false (Mellor 1981, p. 74).
\end{quote}

The final sentence must refer to \textit{additional} utterances of the tensed sentence type, for a given token cannot find itself any place other than when and where it is uttered.

There is a more fundamental difficulty with Smith's argument. Kaplan has argued persuasively that the truth condition of an indexical expression is determined by two things: (i) the linguistic meaning or 'character' of the indexical; and (ii) the context of utterance (Kaplan 1989). Therefore, two utterances of the same indexical expression type can differ in content (i.e. have different truth conditions) while two tokens of different sentence types (i.e. types that differ in character) can have the same truth condition. It follows that two utterances with an identical truth condition can resist intertranslation.

To see this, imagine a conversation between two friends, John and Kathy, in which John utters,

\begin{quote}
(3) I am six feet tall
\end{quote}

and Kathy replies,
(4) You are six feet tall.

Now, (3) and (4) have the same truth condition, but we could not eliminate sentence type (4) from our language in favour of (3) (nor vice versa) for that would leave Kathy (John) with no way of conveying the information she (he) wishes to convey. Indexicals allow persons with different perspectives to communicate the same information. Identity of truth conditions may be necessary for translatability, but it is not sufficient. So even if Smith had not equivocated on the type/token distinction, his argument would have been inconclusive.

4. Tensed Entailment Relations

A deeper criticism leveled by Smith against Mellor's account and tenseless theories of time in general is that they cannot explain obviously valid inferences between tensed sentences. Consider that

(5) It is now 1999

entails that

(6) 1999 is present

and vice versa. Smith, quite rightly, takes it that for two sentences to entail each other, their truth conditions must entail each other. Unfortunately for Mellor, a token-reflexive account of the truth conditions of tensed sentences won't live up to this requirement. For the truth conditions of any tokens of (5) and (6) would, on his account, be given by,

(5') (5) is uttered in 1999

and,

(6') (6) is uttered in 1999
respectively. But these sentences fail to entail each other. It is quite possible for (5) to be uttered in 1999 and not (6), and vice versa. Smith concludes that (5) and (6) must 'state facts' other than their tenseless truth conditions, facts that account for the entailment relation (see, also, Smith 1994). The most plausible explanation, he suggests, is that each sentence states the tensed facts that it is now 1999 and 1999 is present respectively. These clearly entail each other and indeed they are the same fact (Smith 1987, p. 379). Hence, Smith concludes, only a tensed account of time can do justice to the semantics of our language.

Now, I think that Smith's criticism is important, and highlights a difficulty in Mellor's account. But the implications Smith sees for tenseless accounts of time in general are dubious since he has not shown that a tenseless account of entailment relations such as that between (5) and (6) cannot be found. Indeed, I believe that such an account exists, and I turn now to a sketch of its details.

5. Tenseless Entailment Relations

Consider J. J. C. Smart's tenseless account of time, sometimes called the 'date-sentence theory' of time, 'When P says at t 'time t is now' his assertion is true if and only if t is at t, so that if P says at t 't is now' his assertion is thereby true' (Smart 1980, p. 5). Let's summarize this account as follows,

\[(DS) \text{ When } P \text{ says at } t \text{ 'time } t \text{ is now' his assertion is true iff } t \text{ is at } t.\]

Rather than casting the truth conditions of tensed sentences in token-reflexive terms, (DS)'s truth conditions are relations between dates. At first glance, then, the entailment problem noted above seems not to arise since dates and the relations between them clearly exist whether or not there exist sentence tokens of any kind.

However, Smith rejects (DS) because it sets up tautologies as the truth conditions of sentence tokens that are, he argues, contingent. Consider again an utterance of
It is now 1999 that is made in 1999. If we plug this into (DS) we get the following (with a few minor changes),

(7) When P says in 1999 'It is now 1999' her utterance is true if and only if 1999 is at 1999.

But, Smith argues, (5) is a contingent sentence (type) so the truth conditions of its tokens must also be contingent. As a result, Smith adds, (DS) cannot explain the logical equivalence of (the sentence types) 'It is now 1999' and '1999 is present', for each is a contingent sentence, and a tautology can't make two contingent sentences (i.e. their tokens) true in all and only the same circumstances (Smith, 1987, p. 386).

Smith argues that so far as the tenseless theory of time is concerned, the truth condition of an utterance of (5) is its occurrence in 1999, something that is specified on the left hand side of (DS). The fact that 1999 is at 1999 is no part of the truth condition of any utterance of (5); it is a tautology that is trivially implied by the 'real truth condition' of (5), namely its occurrence in 1999. Hence, (DS) is not really a truth condition schema at all (Smith 1987, pp. 385-6).

However, Smith's claim, that (5) is a contingent sentence type (and, therefore, that all its tokens must be contingent), is asserted without substantial defense. What does it mean to say that a sentence type such as (5) is contingent? Normally, contingency and necessity attach to the truth condition or content of a sentence. So, for example, 'snow is white' is contingently true because it is not (say, logically) necessary that snow is white. Similarly, '2 + 2 = 4' is necessarily true because it is (logically) necessary that 2 + 2 = 4. Therefore, there could be false tokens of 'snow is white'; they occur in any logically possible world where snow is not white (of which there are plenty). The same is not true of '2 + 2 = 4', whose tokens are true at all logically possible worlds, at all times. Smith would be right to point out that 'it is now 1999' is like 'snow is white' in that there are
worlds (indeed, times) at which its tokens are false. But this is insufficient to show that tokens of 'it is now 1999' are contingent, for that depends on their truth conditions. In fact, there is good reason to deny, as does (DS), that tokens of this sentence have contingent truth conditions.

Recent work on indexicals (Kaplan 1989, Kripke 1980, Perry 1979, Putnam 1975) suggests that indexicals are devices of direct reference, i.e. they refer directly to an object (this is, of course, context sensitive) as opposed to referring to it via a sense. In other words, all that an indexical like 'now' contributes to a proposition is a time. The remainder of the sentence expresses an incomplete sense which, when combined with the time (the relevant context), provides a complete thought or proposition (Perry 1977, p. 493). The insights provided by these 'new' theories of reference have been startling, so I take it as a strength of any account of temporal indexicals that it is in alignment with such theories. But, then, 'now' rigidly designates its time of utterance. Hence, a t-token of 'it is now t' ought to express a tautology, and a t*-token of 'it is now t' ought to express a contradiction. This is perfectly consistent with the claim that sentence types such as (5) are such that their tokens can be uttered both truly and falsely, depending on the context of utterance. Tokens of 'it is now t' uttered at t are (necessarily) true (tautologies), tokens of the same sentence type at t* are (necessarily) false (contradictions). Smith's argument would, on the other hand, only go through if the following conditional were true: if a token of a given sentence type is a tautology or a contradiction, then all tokens of that sentence type must express the same tautology or contradiction. But this is utterly implausible in the case of indexical expressions.

Smith protests that even if 'now' is a rigid designator, it does not follow that t-tokens of 'it is now t' express tautologies. Smith writes, 'Now for any tautologically true sentence-token, the truth of the token is entailed by premises stating the relevant tautological fact and that the token occurs' (Smith 1987, p. 386). This certainly seems right. For example, the tautological fact that P → P plus the fact that a token of 'P → P'
occurs are sufficient to entail that the token is true. But, Smith counters, (i) '1999 is at 1999' and (ii) 'S occurs' (where S is any 1999 token of 'it is now 1999') do not entail that (iii) 'S is true'. So a 1999 token of S is not a tautology (Smith 1987, p. 386).

The problem here is that Smith assumes that one can individuate or refer to a particular 1999 token of 'it is now 1999' (i.e. S above) without presupposing that the token occurs in 1999. He takes it that 'S occurs' make no temporal commitment, i.e. does not refer to S's time of occurrence. He admits that the entailment goes through if the premise, (iv) 'S occurs in 1999', is added to the argument, but this suggests that he assumes that this premise is not already contained in (ii) above. However, it is contained there for otherwise S is not a 1999 token of 'it is now 1999', but is in fact not a token at all. For a token is a dated, particular event, hence there is no such thing as a token without a time of occurrence. Tokens have their spatiotemporal properties essentially: change the properties and we have a different token. Any argument that assumes one can refer to a token, S, of 'it is now 1999' assumes that that token has a time of occurrence. Since S can only designate a real token if it is given a time of occurrence (Smith in fact assumes that S occurs in 1999), premise (ii), 'S occurs', is simply shorthand for (ii*), 'a 1999 token of S occurs', i.e. 'S occurs in 1999'. Therefore, the argument consisting of (i), (ii) and (iii) does indeed go through, and Smith's claim that even if 'now' is a rigid designator 'it is now 1999' said in 1999 is only contingent, is properly denied.

Smith has a second, modal objection to (DS). If we assume 'now' is a rigid designator, then a 1999 occurrence of 'it is now 1999' rigidly designates 'the set of all and only those events that, in fact, possesses the property of being the twelve-month period that is [1998] years later than the birth of Christ' (Smith 1987, p. 387-8). Since, Smith argues, the sense expressed by '1999' is 'the twelve-month period that is 1998 years later than the birth of Christ', 'it is now 1999' rigidly refers to a particular set of events (call it A) and asserts its identity with the twelve month period that is 1999 years later than Christ's birth. But, Smith argues, this identity is contingent for there are possible worlds
in which $A$ exists but in which Christ isn't born, or is born a year earlier than in the actual world (though the people of that world don't realize it) and hence $A$ is actually 1999 years later than Christ's birth. Hence 'it is now 1999', which is equivalent to '$A$ is the twelve-month period that is 1998 years later than the birth of Christ', is only contingently true.

There are a number of ways to block this argument. First, one could deny that what one refers to by using 'now' is a set of events. Rather, one could insist that 'now' refers to a *time*, an entity in its own right that contains events but is not identical to them, and that what one asserts with a 1999 token of 'it is now 1999' is that a particular time has a particular place in the timeline, a place that it could not fail to have while retaining its identity. In other words, 'it is now 1999' does not relate a set of events to other events, but a time to another time (namely, to itself). This latter relation remains intact across possible worlds no matter how the name for the time in question might change and no matter what events fill that time or any others. This is a substantive view of time, which Leibnizians will surely balk at, but it is not incoherent. Hence, on this account, any worlds at which the set of events $A$ bears a different set of temporal relations to other events are not germane to the analysis at hand. For if time is substantive, any worlds that contain time are worlds at which, for any $t$: $t$ is at $t$.

However, one might wish to refrain from committing to substantive time. Another alternative is not to follow Smith in asserting that '1999' expresses the sense 'the twelve-month period that is 1998 years later than the birth of Christ'. Rather, one might suppose that '1999' is simply a (Millian) *name* for a certain set of events, a name that picks out the same set as a 1999 token of 'now'. Since names are rigid designators (Kripke 1980), 'it is now 1999' said in 1999 expresses an identity that holds at all possible worlds. Since speakers can use and understand sentences such as 'it is now 1999' even if they have no knowledge of who Christ is or when Christ was born, it is plausible to suppose that '1999' does not in fact abbreviate 'the twelve-month period that is 1998 later than the birth of Christ' but, rather, functions simply as a name for a particular year.
Of course, we can describe 1999 as 'the twelve-month period that is 1998 years later than the birth of Christ', but this does not mean that '1999' is not a (directly referential) name. After all, I can describe Aristotle as 'the most eminent philosopher of the ancient world' even though 'Aristotle' rigidly refers to a particular individual. Moreover, by naming a year '1999' we can immediately make certain inferences, like 'this year is 40 years later than 1959', or 'in 200 years in will be 2199'. This is because '1999' bears to the names of other years the same arithmetic relations that the number 1999 bears to other numbers. But just as '1999' can be the name of the number 1999, so it can be the name of the year 1999. Hence, 'it is now 1999' said in 1999 can serve to identify a set of events or a time much as 'he is Aristotle' could serve to identify a certain man without employing a sense of 'Aristotle'. There are, in sum, good reasons to reject Smith's modal argument.

Let me offer a purely speculative diagnosis of Smith's mistaken insistence that (5) and (all of) its tokens are contingent. Kripke (1980) famously argues that the a priori and the necessary are not coextensive. For example, water is necessarily H₂O in that anything that differed in chemical composition from water would be a different substance. However, that water is H₂O is not something that can be known a priori, it is an empirical discovery. Now, it is clear that one cannot know a priori that it is now 1999. Learning that it is now 1999 is an informative, empirical discovery. But it does not follow that what one learns is thereby contingent. Not, certainly, if indexicals are rigid designators. So perhaps Smith, focusing on the a posteriori nature of our knowledge of the time, conflates the way we learn about the time with what it is that we learn.

Whether or not this is correct, there is no reason to suppose that tokens of a sentence type that can be used to make both true and false utterances are neither tautologies nor contradictions as the case may be. This rebuts one of Smith's arguments against (DS). Can (DS) explain the entailment relation between (5) and (6)? Smith, as noted above, thinks not, writing, 'no tautological fact [such as 1999 is at 1999] can make
two logically contingent sentences or tokens true in all and only the same circumstances' (Smith 1987, p. 386). But it is now clear that (5) and (6) are not 'contingent' sentence types in any meaningful sense. Furthermore, just as 'now' directly refers to its time of utterance, so 'present' (at least in '1999 is present') refers directly to its time of utterance (it functions here as an indexical). After all, both 'now' and 'present' share a character, something like 'simultaneous with the time of utterance'. So, consider again an instance of (DS) with a 1999 token of (5) substituted into it.

(7) When P says in 1999 'It is now 1999' her utterance is true if and only if 1999 is at 1999.

Because (5) is said in 1999 and 'now' thereby refers to 1999, we get the tautological truth condition noted in (7).¹ Now consider a 1999 utterance of (6),

(7') When P says in 1999 '1999 is present' her utterance is true if and only if 1999 is at 1999.

This follows from the indexical nature of 'present'. Hence, the truth condition of this token of (6) is the same as that of the token of (5). Indeed, it is clear that tokens of either sentence type will be true or false in all and only the same circumstances. In other words, all tokens of either (5) or (6), when uttered in 1999, have the same tautologous truth condition, namely that 1999 = 1999. On the other hand, tokens of either will each express the same contradiction at any other time of utterance. So, given any temporal context, all actual and potential utterances of (5) and (6) will have the same truth value and truth condition. The obvious conclusion is that (5) and (6) are logically equivalent sentence types. And it is clear that logically equivalent sentences entail each other (see Paul 1997).

¹Similarly, if (5) is uttered in, say, 1998, then one utters a contradiction.
So the allegedly troublesome entailment relation has been explained using only the resources available to tenseless accounts of time. It is easy, furthermore, to see how to apply this strategy to other tensed sentence types. For example, the entailment of

(8) The day before today it rained

by

(9) Yesterday it rained,

and vice versa. Since 'yesterday' directly refers to the day before the day of utterance, and 'today' directly refers to the day of utterance, 'the day before today' and 'yesterday' share a character, and always refer to the same time when they are uttered. Hence, potential utterances of (8) and (9) will be true on all and only the same occasions. Cases of other tenses can be handled accordingly.

6. Truth Conditions, Meanings and Propositions

It is clear that in order for two sentences to express the same proposition, the sentences must have both the same truth value and the same truth condition. What remains under dispute is whether or not these are sufficient for propositional identity (see Austin 1990, ch. 1). While a detailed analysis of this issue is outside the scope of this chapter, some comments are in order here.

Since a 1999 token of 'it is now 1999' is true if and only if 1999 is at 1999, it follows that '1999 is at 1999' and a 1999 token of 'it is now 1999' are logically equivalent. Some philosophers will be tempted to argue that these sentences do express the same proposition since they have the same content (truth conditions) and hence are each used to, as one might put it, 'say the same thing'. On the other hand, it is clear that the sentences differ in cognitive significance. One could believe that 1999 is at 1999 without
believing that it is now 1999. Perhaps, then, they express different but logically
equivalent propositions.

For the purposes of this chapter, this disagreement needn't be settled. One thing,
however, must be noted. To believe that it is now 1999 (even if this belief is tokened in
1999) is to be in a different mental (belief) state than to believe that 1999 is at 1999
(tokened at any time, including 1999). So, even though 'it is now 1999' uttered in 1999
and '1999 is at 1999' said anytime are identical in content, to believe one involves a
different state of mind than believing the other. (Recall Kaplan's distinction (in Kaplan
1989) between the cognitive significance of an indexical expression, which he equates
with its character, and the propositional content of such an expression, which he equates
with its truth condition.)

That this is the case follows from the fact (noted above) that the belief that it is
now \( t \) will (ceteris paribus, perhaps), when combined with, say, one's desire to do \( x \) at \( t \),
move one to do \( x \). On the other hand, one's belief that \( t \) is at \( t \), combined with one's desire
to do \( x \) at \( t \) will not move one to do \( x \). So if we insist that both beliefs are beliefs in the
same proposition, then we shall have to distinguish the proposition believed from the
state of believing that proposition (see Perry 1979). That is, we shall have to explain the
noted differences in behaviour by appeal to the difference in cognitive significance
(character) between 'it is now \( t \)' and ' \( t \) is at \( t \)' (even when these share a content). Or we
could, on the other hand, distinguish the propositions believed (on some basis other than
their truth conditions). Either way, tensed propositions that are logically equivalent to
tenseless propositions, or else tensed modes of presentation of tenseless propositions are
required for timely action. This is why indexicals cannot be eliminated from language.

However, the tenseless account of time is not threatened here for even if the object of
belief is construed as the tensed proposition *that it is now 1999*, this proposition has a
tenseless truth condition. (It might be argued that the logical equivalence of the
propositions *that it is now 1999* and *that 1999 is at 1999* counts just as much in favour of
the tensed theory of time by providing a tensed truth condition for a tenseless tautology. However, the arguments of chapter 1 demonstrate that the latter proposition is the more plausible truth condition than the former).

We shouldn't, therefore, follow Mellor who (1998, pp. 23-4) equates propositions expressed with the meanings of sentences believed. On his view, what a token of (5) means, hence the proposition it expresses, is given by its tenseless, token-reflexive truth condition, i.e. (5') above. This follows, Mellor argues, from the fact that knowing that an utterance of 'It is now 1999' is true in and only in 1999 is all there is to knowing what 'It is now 1999' means. This very well may be a good account of how we learn to use indexicals but I do not think it follows that the proposition one expresses, in uttering a 1999 token of (5), is that one utters a token of (5) in 1999. It is clear that the linguistic meaning of an utterance is not the same thing as the proposition expressed by that utterance since the character of 'it is now 1999' does not change from occasion to occasion, but the proposition expressed does change because not all tokens will have the same truth conditions (since they depend on the context of utterance) and identity of truth conditions is necessary for propositional identity.¹

Mellor's token-reflexive account has implausible consequences concerning temporal claims about times at which nothing is uttered. For example, consider the following counterfactual claim, '1999 would still be present even if no one were here to say so'. On Mellor's account, to say that '1999 is present' is just to say that 1999 is simultaneous with that particular utterance. But if so, then what one says in uttering '1999 is present' would be false if there were no sentence token at that time. On the view I have defended, all that is required for the truth of the counterfactual statement is that in

¹David Lewis argues that we might not want to call the combination of sentence meaning with context the proposition expressed; he simply calls it the 'semantic value' (Lewis 1980, p. 34). Lewis also distinguishes the context from the index of an utterance and notes that the truth value of an utterance depends on both (and that, on an alternative, equally valid construal, the proposition expressed depends on both). I prefer Kaplan's way of putting things, but, of course, one of Lewis' points is that there is no substantive difference between his explication and Kaplan's.
the relevant possible world 1999 is at 1999, which is true of all logically possible worlds. It is, I believe, a strength of the view defended here that temporal statements are about times (or events) and not about utterances and their locations in time.\(^1\) It is not required that 2199 be 200 years later than a particular utterance in order for 'In 200 years 2199 will be present' to state something which is the case. All that is required is that 2199 be 200 years later than 1999, which is necessarily true.

Perry notices that the proposition that is expressed by an utterance is not the same thing as the proposition that the utterance's truth conditions are satisfied. For example, imagine that a speaker says to \(P\), 'You dropped your wallet'. The proposition expressed is that \(P\) dropped her wallet, which could be true whether or not anything was uttered at that time. On the other hand, the utterance 'You dropped your wallet' would have been true even if someone other than \(P\) had been addressed. In the latter case, a different proposition is expressed by the same true utterance (see Perry 1988, pp. 235-6). Mellor's suggestion that the proposition expressed by 'it is now \(t\)' is that a token of 'it is now \(t\)' occurs at \(t\) is to confuse the proposition that the utterance of 'it is now \(t\)' is true with the proposition that that utterance expresses. To utter 'it is now \(t\)' at \(t\) is to express (a proposition equivalent to) the proposition that \(t\) is \(at\). This is clearly not the same as the proposition that 'it is now \(t\)' is true. Of course, to believe that it is now \(t\) is to be logically committed to the belief that 'it is now \(t\)' is true, but these are not the same proposition.

Sentence types whose linguistic meanings are constant but that express different propositions on different occasions of use are important for communication. In using such sentences we need only remember a handful of unchanging meanings (characters) in order to be able to understand tensed utterances in any temporal context. It is more

\(^{1}\text{Smith's claim that "being present" does not mean (even roughly) "being simultaneous with my utterance" (Smith 1994, p. 114) rings true. I hope to have explained this intuition by arguing that one does not express the proposition that \((5')\) in uttering a token of (5), even if the former gives the correct rule of usage for the latter. In Kaplan's terminology, \((5')\) is not what was said by an utterance of (5).}
efficient to make use of a few tensed sentence types whose tokens vary in truth value, than to utter a different sentence type in every context.\(^4\)

7. The Referential-Attributive Distinction and the Present Tense Copula
I have taken the direct theory of indexical reference as given. Smith, however, believes this theory to be inadequate. He asks us to consider the following sentences,

\[(10) \text{The meeting starts now}\]

and

\[(11) \text{Now is when the meeting starts}\]

and to notice that in (10) 'now' functions as an adverb and is paraphrased by 'at the present time' but that in (11) 'now' functions as a pronoun paraphrased by 'the present time' (Smith 1990, p. 137). Smith argues that the direct reference theory works well for pronominal uses but not adverbial uses of 'now'.

According to the direct reference theory, an utterance of (11) at, say, noon, 1 June 1999 expresses the following (singular) proposition,

\[(12) <\text{Noon, 1 June 1999, the sense of 'is when the meeting starts'}>\]

which suggests that the following translation of (11) will preserve its content,

\[(13) \text{Noon, 1 June 1999 is when the meeting starts}\]

which is a well formed English sentence. Of course, (11) and (13) differ in character, but at Noon, 1 June 1999 they express the same proposition.\(^7\)

\(^4\)So I prefer what Lewis (Lewis 1980) calls 'variable yet simple' semantic values (propositions) to 'constant yet complicated' semantic values. Though he might be right that there is no philosophical difference, the former seems to be a better portrayal of actual usage.
However, if we try the same move with (10) we get the following expressed proposition,

(14) <Noon, 1 June 1999, the sense of 'the meeting starts'>

which leads to the following content-preserving translation,

(15) The meeting starts noon, 1 June 1999

which is syntactically incomplete. Smith's conclusion is that in its adverbial use, 'now' contributes a sense to a sentence, namely, the sense of 'at' or 'simultaneously with' (Smith 1990, p. 138). Therefore, the direct reference theory is incomplete.

Two comments are in order here. First, as far as Smith's argument might go, it has no bearing on the debate over the status of tense. Even if 'now' does indeed introduce a sense such as 'at' or 'simultaneously with', these are senses that are in tenseless terms so even if the direct reference theory were to be modified as Smith's criticism suggests, the temporal debate would remain unaffected. Smith recognizes this point and only uses the distinction between pronominal and adverbial uses of 'now' to introduce his fundamental point, which is that 'now' also serves to ascribe the property of presentness to events or times (the initial distinction simply softens the blow of this more radical maneuver; more on this below).

Second, while Smith's argument is suggestive it is not decisive. To see this, imagine a crime novel in which a murder occurs at a faculty meeting and that the fateful meeting is introduced by the very first lines of the novel as follows,

Noon, June 1 1999. The meeting starts. Professor Jones coughs nervously then begins her opening remarks . . .

'I am following Smith and writing 'the meeting' even though it is an improper definite description and cannot serve to introduce a sense (see Smith 1990, fn. 3). 'The meeting' should be understood as short for something like 'the one and only 1999 admissions meeting of the University of Toronto department of philosophy'.
It is perfectly clear what is said by the first two sentences in this passage; any competent speaker of English who reads what is written above will understand that the author is expressing the proposition that the meeting starts at noon, June 1 1999. To what are we to look for the contributed sense? I suggest we look to 'starts', as Perry suggests (Perry 1977, p. 494). No other word is a candidate. If the first sentence had been left out of the above passage, the reader would assume that the meeting starts at some time or other; 'The meeting starts' would be understood as 'The meeting starts [at some time or other]', a time to be determined by subsequent, contextual revelations. It is not, therefore, at all far-fetched to attribute the sense of 'at' to 'starts', even though, as Smith complains, this would make 'Noon is when the meeting starts' and 'Noon is when the meeting starts at' truth-functionally equivalent in extensional contexts, which he believes they cannot be since the latter is syntactically ill-formed (Smith 1990, p. 138). However, though the latter sentence may be syntactically ill-formed, it is easily understood, and one can conceive of English evolving so that sentences ending in indefinite articles become grammatically acceptable. Smith is simply taking surface grammar as decisive; but surface grammar is constantly changing and ought not to be a final court of appeal.

However, the real point of Smith's attack, as mentioned above, is that once we have accepted that indexicals are more than devices for merely introducing referents, we have less reason to reject the subsequent move to 'introduce the sense of "is present" or "has presentness" into the adverbial and pronomial [sic.] uses of "now"' (Smith 1990, p. 143). But his argument for this conclusion turns out to be question-begging. Smith again draws our attention to an entailment relation, that between

(16) The meeting is starting

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*Recall that, as Quine points out (1960, p. 118), some languages, such as Russian and Polish, have no articles, and the French phrase 'Il est medecin' translates 'He is a doctor'. Different yet successful grammars are possible.*
(17) The meeting starts now.

Tenseless time plus direct reference can't explain this relation, Smith contends, because (17), uttered at noon, 1 June 1999 would then express the following,

(18) The meeting starts at noon, 1 June 1999

which does not entail (16) since (18) can be uttered truly when (16) would be false (say on 2 June 1999). The natural move for the tenseless theorist is to paraphrase (16) as,

(16') The meeting is now starting

which is manifestly equivalent to (17). Note that (as argued in section 5 above) even though (17) and (18) are different sentence types, the noon, 1 June 1999 token of (17) is equivalent to any token of (18). Similarly, the noon, 1 June 1999 utterance of (16) is equivalent to all tokens of (18) (assuming the equivalence of (16) and (16')). Hence, on any given occasion, (16) and (17) have tokens whose truth values are the same so they are indeed equivalent sentence types, whose mutual entailment relations can be understood tenselessly (obviously, any utterances of (16) and (17) that occur at times other than noon, 1 June 1999 are equivalent to a different tenseless sentence type than (18), but they are equivalent to a tenseless sentence nonetheless).

Smith insists, however, that (16) is not equivalent to (17). He claims that while a sentence containing a temporal indexical refers to its time of utterance, and hence expresses a different proposition on each occasion of use, the present tense copula 'is neutral with respect to dates; it does not refer to the date of its utterance or any other date' and, therefore, sentences such as (16) 'express the same proposition on each occasion of use' (Smith 1990, p. 141). Smith also puts the point by saying that the present tense of the copula 'has a constant semantic content' (Smith 1990, p. 141).
On the face of it, this claim is extremely implausible. How can two different utterances of 'The meeting is starting', said at the start of different meetings, perhaps years apart, each express the same proposition? After all, the respective utterances have different truth conditions, and tokens with different truth conditions cannot be understood as expressing the same proposition. But it is precisely this claim that is essential to Smith's position. Smith argues that only the attribution of presentness to the meeting in question is a plausible candidate for the constant semantic content of the various utterances of (16). In other words, Smith claims that every utterance of (16) ascribes presentness to a meeting, and this attribution is invariant from occasion to occasion. But, if that is the case, then the only way to explain the entailment relation between (16) and (17) is to claim that 'now', in (17), also attributes presentness to the meeting (in addition to its referential role). Therefore, the direct theory of indexical reference is incomplete (Smith 1990, pp. 142-4). So it is obvious that without the 'constant semantic content' claim, the argument does not go through. Unfortunately for Smith, the claim is not supported.

What the claim of constant semantic content amounts to is the assertion that on each occasion of use, sentence type (16) expresses the proposition that a meeting is present understood as the proposition that 'nowness' inheres in a meeting, without specifying when presentness inheres in the meeting. However, even if, despite my reservations, this claim were true, it could hardly serve to justify Smith's conclusion that the constant semantic content of (16) (and the hidden content of (17)) derives from its attributing presentness to an event, for that has been assumed to be the constant semantic content from the start.

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*Indeed, one might want to identify truth conditions with propositional content (see Boghossian 1990), a move I find defensible.

*Bernard Katz suggested this interpretation to me.
One ought, then, to refrain from following Smith in asserting that present tense uses of 'is' are 'neutral with respect to dates'. How could Smith's claim be true? When one says,

(19) It is raining outside

how could a listener understand this phrase appropriately if she didn't assume the speaker meant,

(20) It is now raining outside

or something equivalent? If we accept Smith's position, and view (19) as not implicitly temporally indexed, then why would the listener take the utterer of (19) to be referring to the rainstorm that is outside her window then (which she presumably would do)? After all, each rainstorm is present while it occurs (i.e. simultaneous with its time of occurrence), so how does the listener know (19) refers to the storm she sees at the same time as she hears (19)? Only by taking (19) as equivalent to (20) can we explain this successful act of communication. There is certainly nothing besides the copula, i.e. the speaker's setting her phrase in the present tense, that would single out the rainstorm that is simultaneous with her utterance. I can see no harm, then, in paraphrasing instances of the present tense 'is' as 'is now'.

Smith objects. He argues that at noon, 1 June an utterance of,

(21) It will be true tomorrow that the meeting starts now

is true, but an utterance, at the same time, of,

(22) It will be true tomorrow that the meeting is starting

is false, hence the embedded sentences must have different semantic contents (Smith 1990 p. 142). However, this argument lacks force as shall become clear upon closer
analysis. Smith believes that the utterance of (21) is true because he accepts the claim that a sentence token such as 'the meeting starts now' does refer to its time of utterance and therefore he assumes that the 'now' in (21) refers to the time of utterance of (21). Since (21) is uttered at $t$ and the embedded sentence in (21) also refers to $t$, then what (21) says is that it will be true, even a day after $t$, that the meeting and $t$ coincide (the B-theorist takes 'coincide' tenselessly, Smith would put it in the past tense; the difference is not important here), which is true.

However, Smith takes the embedded sentence in (22) not to refer to the time of utterance of (22) but only to predicate presentness of the meeting in a way that is 'neutral with respect to dates'. But now it is hard to see why (22) is false when uttered at $t$. If 'the meeting is starting' simply predicates presentness of the start of the meeting without specifying the date of the presentness, then it is correct to say that it will be true tomorrow that the meeting is starting, for one is saying quite truthfully that that the start of the meeting is present at some time or another obtains tomorrow as well. If, on the other hand, 'the meeting is starting' asserts that the meeting is now present then (22) is not false as it is equivalent to (21) (this is the reading that I recommend based on the arguments above).

What reading of (22) could render its token at $t$ false? If (22) were paraphrased as 'it will be true tomorrow that the meeting is starting then', or 'it will be true tomorrow that the meeting is present tomorrow' (in both cases the 'is' is tensed) then clearly (22), uttered at $t$, is false. But this interpretation would come at a high cost to Smith's argument. First, it would contradict his claim that the present tense copula is neutral with respect to dates since it specifies the times at which presentness inheres in the meeting. More importantly, since 'the meeting is starting then' and 'the meeting starts now' are obviously non-equivalent sentences, the difference in truth value between (21) and (22) would not, on the above understanding, be telling in the way Smith wants since it could not be used to show that 'the meeting starts now' and 'the meeting is present' are not equivalent (the
latter sentence has dropped out of the analysis). There is, then, no reading (22) that can be used to support Smith's claim concerning the present tense copula. Smith's arguments against the direct theory of reference for temporal indexicals are inconclusive.

8. Conclusion

The tenseless theory of time can account for the semantic properties of tensed language, at least those brought to light by Quentin Smith. I do not claim that it is the account of temporal language presented above that settles the dispute in favour of tenseless time, only that a tenseless ontology is compatible with the semantics of tensed sentences. It is important that one's metaphysics be consistent with the way language works for surely language has developed in response to the world around us and will, therefore, generally reflect its structure. So even if there is no reason to expect the study of language to be the highest court of appeal for philosophical disputes, it is usually fruitful, as I believe it has been here, to examine the linguistic elements of an important metaphysical issue.
1. Introduction

The following theses are commonly thought to provide mutual support for each other,

(i) Freedom of action - at least some human actions are free;

(ii) Tensed time - future events differ in ontological status from past or present events (i.e. future events are indeterminate);

(iii) The denial of bivalence - some propositions lack determinate truth values.

It is not hard to see how these claims hang together. A well-known line of reasoning runs as follows.¹ Freedom of action requires that the future be indeterminate, its events (particularly our future actions) merely possible. This is taken to ground the assertion that propositions about future events have no determinate truth values since the events they are about do not yet (and might never) exist. Finally, the fact that future-tense propositions lack a determinate truth value is believed to clear away any logical obstacles on the path to freedom.²

I think that the direction of argument sketched above is plausible. It is prima facie reasonable to start with something as familiar and important as freedom of action and move from there to conclusions about the nature of time and logic. Unfortunately, if this reasoning is correct, then any threat to a tensed account of time is a threat to human freedom. Accordingly, I argue in this chapter that one can be committed to a tenseless view of time and the classical logic of bivalence without endangering human freedom in

¹It can be traced to Aristotle's De Interpretatione (Aristotle 1941, ch. 9), though the interpretation of this chapter remains controversial. For similar arguments see Jan Łukasiewicz's 'On the Notion of Possibility', 'On Three-Valued Logic' and 'On Determinism' (all reprinted in McCall 1966).
²Taylor (1962), for example, argues that bivalence applied to future tense propositions entails fatalism.
any meaningful way. I shall do so by investigating the famous alleged incompatibility of divine foreknowledge and free action. The incompatibility thesis is unsound for reasons that will shed light on the implications for freedom of tenseless time.

2. The Incompatibility Thesis

Consider a presumably free action, Jones mows her lawn on July 1st, 2008. Perhaps Jones reasons as follows on the morning of the first: 'I had planned earlier in the week to mow the lawn, the grass is getting too long, I have the day off, and I enjoy the exercise of mowing, so I will now proceed to mow the lawn'. What, it seems, could be freer than her subsequent mowing?

Assume God exists and is 'essentially omniscient', i.e. it is logically impossible for God to hold a false belief or for there to be a true proposition that God does not believe (Pike 1965). Hence, 'God believes X' entails 'X is true', and vice versa (Pike, p. 33). This omniscience condition applies to God at all times. In other words, there is never a time at which God does not believe all truths, including truths about future times (Pike, pp. 29-31). Consider the following proposition.

(P) Jones mows her lawn on July 1st, 2008.

If an omniscient God exists, then (P), if true, is believed by God at all times (say, for example, on July 1st, 1928).

But then it seems that in order for Jones to be free on July 1st, 2008 to refrain from mowing her lawn, one of the following statements must be true of that time,

(1) She has the power to make God have a false belief;

(2) She has the power to bring it about that God believed otherwise than God did eighty years ago;
(3) She has the power to bring it about that God did not exist eighty years earlier' (Pike, pp. 31-2).

All three options seem to be ruled out. (1) is ruled out by hypothesis, for an omniscient being cannot be a being who holds a false belief. (3) is also ruled out by hypothesis since we have posited the existence of an omniscient God who exists at all times. (2) is not ruled out by God's omniscience, for we can assume that the alternate belief God holds is a true belief. However, it seems to be ruled out by what we might call the 'fixity of past belief' (FPB) condition. Pike puts it as follows,

No action performed at a given time can alter the fact that a given person held a certain belief at a time prior to the time in question. This . . . seems to be an a priori truth (Pike, p.33).

If (2) is true then this intuitively plausible principle appears to be violated. Therefore, foreknowledge is incompatible with freedom of action.

This is not, it must be noted, a uniquely theological problem. The difficulty is one to be considered by anyone defending tenseless time. Tenseless theories of time deny any ontological asymmetry between past and future. Hence, if the past is knowable (which it surely is), then knowledge of the future cannot be ruled out a priori or by considerations of time alone. Since the concept of foreknowledge is not apparently incoherent it is worth investigating its possibility (whatever one's feelings concerning the existence of God) in order to clarify the relation between time and freedom.

3. Hard and Soft Facts

An early response to Pike that is worth examining is that put forth by Adams, who proposes a criterion for a fact-statement to be about a particular time, t,
Statement $p$ is at least in part about a time $t = df$. The happening or not happening, actuality or nonactuality of something at $t$ is a necessary condition of the truth of $p$ (Adams 1967, p. 493).

With this in hand, she then distinguishes two types of fact about a given time, $t$: 'hard' facts and 'soft' facts,

Statement $p$ expresses a 'hard' fact about a time $t = df$. $p$ is not at least in part about any time future relative to $t$ (Adams, p. 494).

A soft fact about time $t$, in contrast, is one that is at least in part about times future relative to $t$.

Recall that the incompatibility thesis depends on the FPB condition. But this condition is really just a special case of the general claim that, relative to any given time, the past is fixed. Call the general condition the 'fixity of the past' condition,

(FP) One does not have the power (at a given time) so to act that the past (relative to that time) would be other than it was (Adams, p. 492).

The reason for introducing the hard/soft fact distinction is that (FP) is supposed to hold only when considering hard facts, not soft facts. This can be made plausible. If, for example, the end of World War II is 54 years earlier than the writing of this chapter, this is a fact about 1945 that could easily have been changed this year, by my simply deciding not to write this chapter. But this is not an instance of changing the past because the fact that W.W.II is 54 years before the writing of this chapter is not a fact that is only about the past; it is also about the present (it's a fact only if I write this chapter in 1999). Hence, I can now change the fact without changing the past by changing the present event that the fact is in part about. Once this distinction is granted one is free to argue, as Adams does, that God's existence is not a hard fact about any time. After all, for any time, $t$, God

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*Adams is setting up a solution similar to that of Ockham (1983) who distinguishes statements entirely about a time, $t$, from statements only in part about $t$. For a thorough analysis of the medieval arguments concerning future contingents see Normore 1982.*
must have beliefs about the future relative to $t$, but these beliefs depend on future events, therefore one can in fact bring it about that God did not exist (Adams, pp. 495-9).

Unfortunately, Adams' distinction is untenable. John Martin Fischer has noticed that it entails that all statements express soft facts about a given time. Consider, for example,

(4) Jones existed at $t_1$,

which entails,

(5) Jones did not first exist at $t_2$ (where $t_1 < t_2$)

since (5) must be true for (4) to be true. However, if anything is a hard fact statement, (4) is, so Adams' distinction is no good (Fischer 1983, pp. 73-5).

It is hard to see how Adams could respond to Fischer's attack. Facts have logical relations such as entailment and it would be implausible to deny that a fact statement such as (4) is true only if a statement such as (5) is true. Given the meaning of 'exist', there seems to be no way to avoid this relationship, and there are probably many other problematic counter-examples (though even if 'exist' is the only one it is enough to scuttle the proposed solution).

I shall, therefore, recommend another tack in approaching the problem, one that begins by asking, what are the implications of attributing knowledge of the future to God? Pike's argument states that God's beliefs are logically equivalent to knowledge. Assuming, then, that God believes (P) on July 1st 1928, it is legitimate to ask for some account of this knowledge-belief. Therefore, let us inquire into some of the criteria the term 'knowledge' must satisfy to be correctly applied. The natural place to begin is with human knowing.
4. Eliminating Possibilities

Human knowledge of the future is a matter of reliably predicting future conditions or events on the basis of our knowledge of current or past conditions or events and laws of nature (or, perhaps, logical laws) relating the two. Schematically, let the following represent human foreknowledge,

\[(HF) \quad Ct_1 \Rightarrow Ct_2\]

where 'Ct' stands for 'conditions at time t' and '⇒' indicates a law-governed connection between conditions. So long as one has access to \(Ct_1\) and knows its law-like connection to \(Ct_2\), one can know the future condition.¹

But we shouldn't imagine that God knows of the future in this way; not if foreknowledge is to pose a threat to freedom. After all (HF) is a schema that clarifies how we humans reliably predict the future; the knowledge in such cases is indirect in that it is not based on immediate acquaintance with the foretold event. It is the law-like regularity between conditions that makes the predictions reliable enough to count as knowledge. However, even perfect prediction does not threaten freedom. As prediction is parasitic on the law-like connection between conditions, it is clear that the act of predicting, or the belief formed as the result of knowing the earlier conditions and the relevant law of nature, cannot itself be what constrains the future event. Take away the prediction (knowledge) and the event is no less determined by earlier conditions. Of course, if we assume that the universe is, say, causally determined, then the interesting feature of the incompatibility thesis is not that God's knowledge (rather, prediction) threatens freedom but that causal determinism threatens freedom since God's knowledge

¹This account is, of course, consistent with causal theories of knowing (see Goldman 1967). If we perceive an event that causes a future event, we can know of the future event so long as we know of the causal connection between the two.
would be a superfluous addition to what is the more direct threat to freedom. Hence we can reject this suggested construal of God's foreknowledge.¹

We might, on the other hand, suppose that God knows of the future by simply willing that it be such and such. This will obviously not do. On this model of divine foreknowledge the question of human freedom has been begged as God's 1928 belief makes Jones mow her lawn in 2008. This would render Pike's incompatibility thesis benign and uninteresting. So we can dismiss the 'reliable predictor' and 'by fiat' explanations of God's foreknowledge.

5. Detection vs. Projection

In a recent book, Crispin Wright draws attention to a distinction that he calls 'the Euthyphro Contrast' (Wright 1992, pp. 108-39). Wright is, of course, making reference to Plato's famous dialogue in which Socrates questions Euthyphro on the nature of piety. As Wright puts it, both Socrates and Euthyphro agree on the following universally quantified biconditional,

\[(E1) \text{ For any act } x: x \text{ is pious if and only if it is loved by the gods (Wright, p. 108).}\]

The disagreement between the two interlocutors is captured, Wright thinks, by the suggestion that Socrates affords a kind of priority to the left hand side of the biconditional in (E1) while Euthyphro accords it to the right. Wright calls Socrates' position (so described) detectivism about piety while Euthyphro's stance is called projectivism about piety. In other words, Socrates believes that it is in virtue of their piety that certain acts

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¹Interestingly, if probabilistic laws are explained by appeal to the indeterminacy of the future, then God's foreknowledge shall be limited if it is based on perfect prediction. In particular, an event that gives rise, with equal probability, to two future events cannot be used to predict which of the future events will come about. Similarly, if Quantum Mechanics commits us to ontological indeterminism, then God could not predict the behaviour of micro-particles on the basis of knowledge of their past states.
are loved by the gods while Euthyphro argues that it is in virtue of being loved by the
gods that those acts are pious.

In the case of divine foreknowledge, we are faced with a similar dilemma since
the meaning of 'omniscient' entails the following biconditional,

\[(O_1) \text{ For all propositions } p: p \text{ if and only if God knows (believes) that } p.\]

Like \((E_1)\), \((O_1)\) can admit of either a detectivist or projectivist reading. On the former
reading, \((O_1)\) is interpreted as reflecting the fact that God is a perfect perceiver of all
things, i.e. that nothing escapes 'God's gaze'; on the latter reading, God's act of judging
that \(p\) determines that \(p\), i.e. God's belief that \(p\) makes it the case that \(p\).

I have argued in the previous section that conceiving of God's foreknowledge in
accordance with the projectivist reading of \((O_1)\) renders the incompatibility claim
uninteresting since clearly anything that makes it the case that \(p\) is incompatible with \(\sim p\).
In other words, this reading makes God's foreknowledge much more than mere
knowledge of the future; it is, rather, that which determines the future, in which case it
ought not to be called 'foreknowledge' but, quite simply, 'predetermination'. Of course
this act of renaming would eliminate any feelings of uneasiness one might have towards
Pike's conclusions.

The question that remains is, how are we to construe God's knowledge such that it
is something plausibly called 'knowledge' and that affords us a detectivist and not a
projectivist reading of \((O_1)\)? If we can satisfy both of these conditions without
threatening human freedom, then we can rest assured that a fully foreknown future is
compatible with freedom and, therefore, that the B-theorist's view of the future as
ontologically determinate is compatible with human freedom since the former is a
stronger relation than the latter, i.e. the future can be fully foreknown only if determinate,
but it can be determinate and not foreknown.\textsuperscript{7} The solution to this challenge is the topic of the next section.

6. Divine Foreknowledge and Causation

Knowledge differs from mere dogmatic assertion. The difference is that knowledge, but not dogmatic assertion, requires that the act of knowing and the event known be connected in some way.\textsuperscript{4} Call this the 'connection condition',

(CC) Knowledge that an event, \( e \), occurs must be connected (in some way) to the occurrence of \( e \).

In the case under consideration,

(CC)\textsubscript{C} God's knowledge-belief, held at \( t_1 \), that Jones mows her lawn at \( t_2 \), must be connected in some way to the event of Jones' mowing her lawn at \( t_2 \).

Knowledge by prediction and by fiat satisfy (CC), but are perfectly compatible with a determinate future and also fail to pose any interesting threat to human freedom, i.e. any threat that might allow us to draw conclusions concerning the relation between tense and freedom.

Obviously (CC) is extremely vague as written. There are all sorts of possible connections between the belief that a certain event occurs and that event that would not serve to turn a belief into knowledge. What (CC) is intended to capture is the dependence of beliefs on their objects (rather than vice versa) such that some sort of alteration in the

\textsuperscript{4}However, Normore 1982 discusses some medieval philosophers who denied this.

\textsuperscript{7}I am deliberately limiting the discussion to one concerning knowledge of \textit{events} since it is such specific foreknowledge that seems to threaten freedom. I am \textit{not} assuming that \textit{all} knowledge must adhere to the analysis that follows. For example, \textit{a priori} knowledge or knowledge of general truths might have different connections than that which I shall propose below. But I do assume that any belief can only be a belief about a particular (contingent) event if the belief is connected in some way (along the lines outlined below) to the event itself. How else could it be \textit{about} that event?
object of belief would and must be reflected in the belief itself if that belief is to count as knowledge.

Given these rough guidelines, how else might we characterize God's foreknowledge so as to satisfy (CC)? One suggestion might be the following. There exists a unique description of Jones' mowing her lawn and God has this description in mind on July 1st, 1928. God thus denotes the event (Russell 1956) and thereby knows of it. The problem with this suggestion is that it merely pushes the question back further. After all, one can hit upon a true proposition containing a definite description by luck. If God describes the future correctly, then what we really want to know is how this is done. Furthermore, as Donnellan has pointed out (Donnellan 1966), definite descriptions do not necessarily refer, so in those cases in which they do, presumably some connection other than satisfaction is required. (I assume that a definite description that functions merely attributively is neither necessary nor sufficient for knowledge and thus cannot be used to satisfy (CC)).

There remains, however, an interesting alternative. We can suppose that God somehow sees future events before they happen, as if God has a 'time scope' that looks into the distant future as a telescope looks into distant space. In other words, God is made directly aware of future events; they are presented to God's mind analogously to the way in which visual images are presented to our own. This explanation is in keeping with Pike's conception, as he writes, 'All things are "present" to God in the sense that He "sees" them as if . . . they were actually before him . . . I shall work . . . with this . . . interpretation of God's knowing everything from eternity' (Pike, pp. 30-1).

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As Donnellan points out, definite descriptions only refer when the entity referred to is somehow brought before one's attention, which suggests something along the lines of a causal-perceptual explanation. See Donnellan 1966.

Again, those unhappy with the theological terms employed in the argument can imagine that a scientist invents a time scope and looks into the future. How can those future actions be free unless one has the power to alter past visual beliefs?
It remains to clarify the nature of this direct awareness. I put forth the proposal that God is directly aware of future events if and only if God's beliefs are caused by those events. This suggestion is plausible for a number of reasons. First, it satisfies (CC) in the right way since causation is an asymmetric concept. Secondly, it does not apparently beg the question against human freedom. Thirdly, it makes the nearly irresistible analogy (drawn on by Pike) between foreknowledge and foresight understandable. Finally, it satisfies the intuition that in general knowledge of an event is caused by that event (which is vindicated by the difficulty in coming up with other conceptions of knowing; see Normore 1982, pp. 378-81).

If God is supernatural, then clearly 'causation' in this case must be understood more widely than as the instantiation of a physical law (even if some sort of law-like connection is entailed by the claim that Jones' actions cause God's beliefs). In the context of this chapter, this is a minor concern. After all, if God exists, then physicalism is false and the causal connection required here would then be spelled out in terms of law-like correlations between natural and supernatural events. The key point, however, is that we have found a way of construing God's foreknowledge that is neither trivial nor question begging. Does it threaten freedom?

7. Causation and Explanation
Before answering this question, let me add a few remarks concerning the appeal to causation in the preceding section (it is a minor concern but worth discussing). The problem is to explain (O1) above, i.e. to explain how it is that for all p: p iff God knows that p. I suggested (section 3) that the attempt to account for God's foreknowledge ought to be illuminating, but I think it is also necessary that it be illuminating, for the following reason. If we abstain from the attempt to explicate the manner in which God comes to know of all events, i.e. if we simply accept the equivalence captured by (O1), then we have no way of distinguishing the detectivist from the projectivist reading of that
biconditional. But if we have no way of differentiating the claim that God's belief that \( p \) makes it the case that \( p \) from the claim that God's belief that \( p \) is responsive to the fact that \( p \), then it is unclear what the significance of the incompatibility thesis could be, for Pike's Boethian conclusion could simply result from the refusal to engage in the fine grained analysis of God's foreknowledge required to pry apart these two understandings of the logical equivalence captured by (O1).

Obviously, then, I am imposing a 'no miracles' condition on our understanding of God's foreknowledge. That is, I disallow the following principle,

\[(M) \text{ For all (true) } p: \text{ God knows immediately and miraculously that } p\]

on the grounds that it prevents us from distinguishing the detectivist and projectivist understandings of God's foreknowledge.\(^{11}\) (M) assumes that miracles are mysterious and resist explanation. If, on the other hand, one means by 'miraculous' something less opaque, then perhaps (M) is acceptable. If, however, one refuses to allow any elucidation of the nature of the 'miraculous' connection, then the supposition that God exists loses its utility as a heuristic device for thinking about the relation between freedom and foreknowledge (which is my interest here).

So, having accepted the need to explain God's foreknowledge, why do so in terms of causation? I shall address this question by way of a consideration of explanation in general. Explanation has an epistemic as well as an ontic component. In order for an explanation of some event to count as a good one, it must help us to understand the event, or expect the event, or put the event in a coherent framework, etc. Authors such as van Fraassen (1980) argue that explanation is entirely a matter of *pragmatics*, i.e. satisfying our interests concerning an event, and deny any other element as necessary for an explanation. Similarly, Hempel (1962) argues that so long as we construct a nomological

\(^{11}\)The need to deal with this principle was brought to my attention by Jim Brown.
framework within which the event can be placed as conclusion, the event has been explained. Whether or not there is any external relation between the event to be explained and the conditions cited as explanation is immaterial to such epistemic theorists of explanation.

However, following a position that Kim calls 'explanatory realism' (Kim 1987, p. 229), I take it that an adequate explanation must also cite some objective relation between the explanans and the explanandum in virtue of which the explanation is genuine. Say that we are attempting to explain why an event, $e$, occurred. Let $E$ be the explanandum 'that $e$ occurred' and $C$ be the explanans for $E$. For $C$ to count as a genuine explanans, it must cite a condition or event, $c$, that bears some ontological relation $R$ to $e$. The mere fact that $C$ bears some epistemic relation to $E$ is insufficient (just as the epistemic virtue of justification is insufficient for a belief to amount to knowledge).

So, in explaining God's event-foreknowledge (and event-knowledge in general), one must posit some objective relation between the event known and the event of knowing, a relation that can serve as the ground of the explanation. Causation is a very plausible candidate (for the reasons cited in the preceding section). Moreover, it is not at all clear that there is any alternative form of explanation of events (Lewis 1986 argues that there are no alternatives while Kim 1974 disagrees; for a variety of perspectives see Ruben 1993). While there may be forms of explanation other than causal explanation (for example, we cite the rules of sentential logic to explain the fact that the sentence 'P&-' is ungrammatical though we balk at saying that the rules caused the sentence to be such), when it comes to explaining events, it is not unprecedented to insist on causation as the only objective explanatory relation. So the perceptual-causal explanation of God's foreknowledge has support from general considerations of explanation.

Some will likely argue that since there is no viable notion of causation that relates physical and non-physical events, the causal-perceptual account of God's foreknowledge is a non-starter. Given the purposes this discussion, this problem can be legitimately
side-stepped. For one thing, it has been argued by some that abstract entities can be causally efficacious. Fred Dretske, for example, argues that it makes sense to say that the difference in weight between two objects caused the balance beam to move (Dretske, 1985, p. 31). The causation could perhaps go the other way around as well. So it may be that we ought to widen our understanding of causation to include relations between physical and abstract entities.

If this does not seem satisfactory, notice that it is not really clear just how abstract Pike's Boethian God is. Pike explicitly assumes that God can have temporal relations to events (such as believing that Jones mows her lawn before she in fact does so) and as Einstein's Special Theory of Relativity has shown us, anything that admits of a temporal specification will also (in some reference frames) admit of a spatial specification (see chapter 2). So Pike might be forced to conceive of God as a kind of Ether that is physically present throughout spacetime, rather than as an abstract Being (Pike indeed assumes that God exists at all times, not 'outside' of time). I'm not sure why one should be prohibited from assuming that God has causal relations to events if it is admitted that God has temporal relations to them.

Finally, if there is no way to make God's existence as an omniscient being compatible with a plausible conception of knowledge, one could just as well take this as an argument against the existence of an omniscient being. But such theological questions are not the point here. It is useful, in order to examine the relation between the ontological status of the future and the possibility of human freedom, to imagine that the future (or some part of it) is foreknown in its entirety. Hence, we may assume that causation can relate physical and non-physical events, even if no such account has been

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17It is admittedly difficult to come up with a good example of this. One could say that the creation of the objects caused the existence of a difference in weight between them. But it might be replied that the weight difference between the two chunks of matter comprising the objects existed all along and was simply taken advantage in making the objects in question. Nonetheless, if it is conceivable that there is one direction of causation between concrete events and abstract states, then the door is opened to allowing such causation in the opposite direction.
worked out to date. After all, it is certainly not logically impossible that abstract and physical events are causally related, so using the possibility of foreknowledge as a thought experiment to elucidate the conceptual relation between freedom and tenseless time remains useful even if the notion of causation required is not actualized; I am not arguing that the future is foreknown, only that it (logically) could be. If, however, one prefers to posit another relation between the events known by God and the event(s) of God knowing them, a relation that enables one to draw the distinction between the two readings of (O1), then I believe that the essence of my solution could be maintained via the new relation (in the next section, however, I shall rule out counterfactual dependence, as a candidate for this relation). One could, for example, rest content with the claim that 'God's foreknowledge depends on the events foreknown', or 'God's foreknowledge is explained by the events foreknown', etc. The hope here is that a widened notion of causation is an enlightening attempt in the spirit of these suggestions.

8. Omniscience, Causation and Counterfactuals

The causal-perceptual account of God's foreknowledge poses a threat to human freedom, but only if causation is explained in terms of counterfactuals. This is because any counterfactual analysis of the relation between God's belief that Jones mows her lawn and...
Jones' mowing of her will be symmetrical. Consider, again, cases of human knowledge. The following counterfactual claim must be true if a human state of mind is to count as knowledge,

\[(6) \text{ If it were not the case that } p, \text{ one would not know that } p.\]

This condition is similar to (CC) in that it must be true if knowledge is to be distinguished from dogmatic assertion. Of course, in the human case, the converse does not hold. **The fact that one knows that } p \text{ it does not entail that **

\[(7) \text{ were one not to know that } p, \text{ then it would be the case that not-} p.\]

In other words, human knowledge is finite. So, if we wish to claim that human knowledge of an event is an effect of that event and we wish to construe causation counterfactually, we can preserve the asymmetry captured by (6) and (7).

But recall that God is *essentially* omniscient on Pike's account. Since it is impossible for there to exist truths that are not known to God, it follows that (i) were it not the case that } p, \text{ then God would not know that } p \text{ and (ii) were God not to know that } p, \text{ then not-} p. \text{ Schematically, **

\[(OC) (~p \square \rightarrow \neg K(G, p)) \& (~K(G, p) \square \rightarrow \neg p)\]

holds for any proposition } p \text{ (I use 'OC' as short for 'omniscience condition). This means that if we follow David Lewis' popular strategy of explaining causation counterfactually (Lewis 1973), then we have no way of preserving the one-way dependence of God's beliefs on future events. That is, if we understand 'A caused B' as 'If A hadn't occurred, B would not have occurred', then God's belief that Jones mows her lawn on July 1st, 2008 causes her to mow her lawn just as much as Jones' actions cause God's belief. So perhaps divine foreknowledge is incompatible with freedom after all.
One solution to this difficulty is to resist the temptation to explain causation along Lewis' lines. It will be useful here to recall Paul Horwich's discussion of counterfactuals (Horwich 1987). Horwich takes as his starting point Goodman's early treatment of counterfactual conditionals (Goodman 1947). Goodman's suggestion was that \( p \square \rightarrow q \) is true just in case the laws of nature and prevailing circumstances combined with the truth of \( p \) are incompatible with the falsity of \( q \). Following Horwich's notation,

\[
(NG) \quad p \square \rightarrow q \text{ if and only if } (p \& S \& L) \rightarrow q.
\]

An immediate difficulty with this analysis is the 'cotenability problem', namely, that if it is in fact the case that \( \neg p \), how are we to exclude \( \neg p \) from the prevailing circumstances, \( S \)? They must be excluded for otherwise all counterfactuals with false antecedents will be trivially true (since the antecedents of their analysans will be contradictory and, therefore, false). But how can one exclude \( \neg p \) from \( S \) without invoking counterfactual claims (such as 'include in the circumstances \( S \) all facts that would remain true even if the antecedent were true), which would render the analysis circular?

Horwich's idea is to use causation as the means of screening off \( \neg p \) from \( S \). For Horwich, \( S \) may include any facts that are causally independent of \( \neg p \) (Horwich 1987, pp. 158-61). Anything that is the cause of, or caused by \( \neg p \) must be excluded from the prevailing conditions. So, for the counterfactual conditional, \( p \square \rightarrow q \) to be true, Horwich argues, is for the world, changed in the relevant way (i.e., assume \( p \) rather than \( \neg p \)), with only what is logically, causally and nomologically independent of \( \neg p \) held fixed, to determine \( q \). Horwich thereby explains counterfactual conditionals in terms of causation rather than vice versa.

So let us follow Horwich and take it that causation can be explained without recourse to counterfactuals. It is now clear that (OC) is no threat to maintaining the desired asymmetry between Jones' future actions and God's past belief. If we claim that Jones' future actions cause God's past beliefs, then in considering the counterfactual
situation of God's not knowing that Jones mows her lawn on June 1st, 2008, we needn't hold fixed those things that caused God's past belief. In particular, of course, we needn't hold fixed the event of Jones mowing her lawn on June 1st, 2008. But, then, the absence of this event can be cited as cause of the absence of God's past belief; we needn't assume (and, indeed, can explicitly reject the suggestion) that it is the absence of God's belief that causes the absence of Jones' future actions. Therefore, Jones is free not to mow despite God's foreknowledge.

It turns out, then, that Jones has the power to make one of God's past beliefs be other than it was, and this power amounts to nothing more than her normal human freedom not to mow her lawn, a freedom that is not threatened by God's foreknowledge. Freedom is, after all, a counterfactual notion. Jones is free not to mow her lawn, at $t$, if and only if it is logically and nomologically possible that she not mow her lawn at $t$. Or, put in terms of possible worlds, Jones is free to refrain from mowing if there are possible worlds in which Jones does not mow her lawn on July 1st, 2008. But the existence of such possible worlds is not threatened by God's foreknowledge because God's foreknowledge is caused by Jones' actions. But in that case, God's past belief does not constrain Jones' counterfactual situation in any way; if she would have decided not to mow, then that is what God would have believed. To use the time scope metaphor again, whatever God sees in the time scope determines what God believes.

9. Some Objections
One might have reservations concerning the appeal to backward causation in the above solution. In response to this let me point out that the incompatibility thesis assumes that a being can know of an event that happens at a time later than the time of belief. Since this claim is built into the argument we can rule out backward causation only by appealing to knowledge by fiat, knowledge by prediction, or else leave the nature of God's foreknowledge unilluminated. But backward causation is at least not entirely mysterious.
Indeed, there are able defenders of its coherence (such as Dummett 1964, Horwich 1987, and Price 1996). Furthermore, the appeal to backward causation is preferable to leaving God's foreknowledge unanalyzed, in which case the two readings of (O1) cannot be sustained. Finally, the essential omniscience of God is consistent with the causal-perceptual account of divine foreknowledge; one simply needs to assume that God is necessarily (since by definition) a perfect detector of truths.

The attribution to Jones of the power to alter one of God's past beliefs might nevertheless be unsettling. This is likely because a belief is usually regarded as a state of mind, something that is typically fixed relative to later times. However, recall that Jones' power is construed counterfactually: God would have believed differently if, and only if, Jones were to refrain from mowing. The fact that God believed eighty years earlier that Jones mows her lawn in the future does not entail that Jones can't refrain from mowing, only that she won't. Of course, Jones does not have the power to make what was in fact a certain state of mind in fact have been some other state of mind, for this would be an outright contradiction (that a being can, at a given time, both have and not have a certain state of mind).

It is misleading to consider God's beliefs to be like human states of mind since God's beliefs are logically equivalent to knowledge, something that is not true in the human case. We should, at least, be guarded in our comparison because states of mind that are logically equivalent to knowledge cannot be individuated 'internally', i.e. by reference only to what goes on in the mind of the believer. Put another way, if by 'state of mind' we mean some mental event that can be entirely specified without reference to what goes on outside of the mind, then God's beliefs are not states of mind (if externalism in the philosophy of mind is correct, then perhaps even human beliefs are not states of mind)

Fischer attempts to commit positions like the one I am defending to this absurdity: 'it is implausible to suppose that one and the same state of mind of the person who was God at T1 would count as different beliefs given different behavior by Jones at T2' (Fischer, pp. 76-7). But, of course, given the construal above, it is impossible that God have one and the same state of mind in each case. This is a new version of Ockham's response to a similar dilemma (see Ockham 1983).
in this sense). In particular, God's past beliefs about the future cannot be individuated without reference to the future event it is about.

10. Facts and Events

Consider a response to Pike based on the difference between relational and monadic temporal predicates. Suppose that the difference between statements entirely about a time, t, and those only in part about t, lies in whether or not the statement entails that times future relative to t exist. If so, the statement records a soft fact about t, if not, a hard fact about t. To set this up analogously to Adams' formulation,

(S.) A statement, p, is at least in part about a time, t, if and only if it entails that t exists.

(F.) (i) A statement, p, expresses a 'hard' fact about time t if and only if it is not at least in part about any times future relative to t; (ii) p expresses a 'soft' fact about t if and only if it is at least in part about some time, t', that is future relative to t.

Hence, statement (4) above turns out to express a hard fact since it does not entail that any times later than t₁ exist. On the other hand, a statement such as 'the end of W.W.II is 54 years before the writing of this chapter' states a soft fact about 1945 because it entails that 1999 exists (it is true only if a chapter is written in 1999).

I think it is clear that this formulation is immune to Fischer's criticism and does capture the intuitive force of Adams' formulation, i.e. what the real difference is between statements that are and are not about a certain time respectively. So why have I framed my response as I do above? The reason is that I believe that the distinction captured by (S.) and (F.), while correct, is only fruitfully applied to Pike's problem derivatively. That is, its relevance to foreknowledge and freedom depends on the relations between the events that underlie the facts.

1'The solution that follows was suggested to me in conversation by Bernard Katz.
The question that needs to be addressed on a fact-based response is, why is this distinction of facts relevant to human freedom of action? Why, that is, can one act so as to alter soft facts and not hard facts? The most plausible response is that in the case of soft facts one can causally influence one of the events to which the statement refers. Take the soft fact statement, mentioned above, concerning World War II and the writing of this chapter. This statement can be changed, I have argued, because I can currently, or at some earlier time, remove a causally necessary condition for the occurrence of the event of my writing this chapter. In other words, it is because it is possible for me to prevent myself from writing this chapter that the fact statement can be falsified after W.W.II. On the other hand, since backward causation never occurs (or, at best, occurs extremely rarely), past events cannot be changed (i.e. affected).

I take it, therefore, that the ability to alter facts is supervenient on the ability to alter events. The most plausible way of understanding this latter ability is causally, in terms of putting into place or preventing causally sufficient or necessary conditions of events. Hence, I view \((S_i)\) and \((F_i)\) as applicable to Pike's problem, but the deep explanation of this success will depend on a causal story like the one presented above. So, the causal solution to the incompatibility thesis is compatible with distinctions such as \((S_i)\) and \((F_i)\).

It follows from this that there is a perfectly reasonable way of distinguishing those events that can be altered at a given time from those that are fixed as of that time. Only those events that are causally inaccessible as of a time can no longer be altered at that time (we may call these hard events); those that are not causally isolated in this sense can be affected at that time (soft events). Therefore, God's belief that Jones mows her lawn on July 1st, 2008 is not a hard event as of July 1st, 1928, it is a soft event occurring on July 1st, 1928. And that is why Jones has the power to make it have been different from what it was. The causal-perceptual solution to the incompatibility thesis is immune in general to the sort of counter-example that Fischer raises.
11. Tense, Logical Fatalism and Determinism

Consider the following Aristotelian argument for fatalism based on bivalence. If it is true (false) that there will be a sea battle tomorrow, then there will (will not) be a sea battle tomorrow (this follows from the disquotational schema, 'P' is true iff P). The present truth (falsity) of 'there will be a sea battle tomorrow' appears to entail that one cannot do anything tomorrow to avoid (bring about) the sea battle. So, if all propositions, even those concerning future times, have determinate truth values, then fatalism follows.

This argument has some striking similarities to Pike's incompatibility thesis and the response to logical fatalism is analogous to the response to Pike, namely, that one does have the power to make a future tense proposition, uttered in the past, true (false). The reason why it is true (if indeed it is) that there will be a sea battle tomorrow is that a sea battle occurs on the day after today. Were one to act so as to prevent the sea battle, then 'there will be a sea battle tomorrow' would be false when uttered today. Just as tomorrow's actions cause God's past beliefs, propositions concerning tomorrow are true in virtue of tomorrow's events. The wide application of bivalence does not entail fatalism.

The proponent of the indeterminate future might at this point raise the following objection. Perhaps foreknowledge and universal bivalence do not themselves pose a threat to freedom; nevertheless, the only reason to call an action 'free' in the first place is that at the time of deliberation the action was yet to be actualized. In other words, the objector claims, an assertion such as 'Action A is free' is true if and only if A was at some point ontologically indeterminate.

The reply to this is two-fold. First, it remains for the objector to back up her claim since, whatever its initial plausibility, it stands in need of support. Secondly, this claim has serious ramifications for tenseless time only if the truth of 'A is at some point indeterminate' can be shown to be necessary for the truth of 'A is a free action'. Even if it
is sufficient,\(^6\) the objector’s argument will not go through unless it is also shown that tenseless time is inconsistent with freedom of action. The arguments above, however, demonstrate that the determinate future is compatible with freedom and so is not sufficient for fatalism or determinism (contra Rudd 1997). The fully determinate future is what will happen, it is not what must happen (see also Craig 1988). It is, in other words, coherent to maintain that though the future is actual, it is not necessary.\(^5\) Indeed, I suspect that even the tense theorist would admit that a past event, such as a free action or a result of a chance process, can be determinate but nonetheless retains its status as undetermined by earlier conditions.

Here is one way to conceptualize tenseless indeterminism. Determinism is a matter of causal laws plus initial conditions necessitating certain later conditions, i.e. being consistent with only one set of subsequent conditions. If condition \(C_1\) along with laws of nature \(L\) entail (or ascribe a probability of 1 to) condition \(C_2\), then \(C_2\) is determined by earlier conditions. But even if \(C_2\) is fully determinate it might not be determined. For example, it is possible that \(L + C_1\) fail to determine \(C_2\) owing to the indeterministic character of the set of laws \(L\). The universe could simply be such that initial conditions and the laws of nature are compatible with various outcomes. Imagine that there are two possible worlds in which \(L + C_1\) obtain (tenselessly) at \(t_1\), yet in one world, \(C_2\) obtains (tenselessly) at \(t_2\) while at the other, \(C_3\) obtains (tenselessly) at \(t_2\). Here

\(^6\)Which is not obvious. McCall, for example, goes to great trouble to reconcile freedom of the will and the open future (McCall 1994, pp. 250-279). The difficulty for McCall is that the tree model (on his view) is an indeterministic model of reality and it is hard to see how chance events can be actions at all (i.e. the rational products of human deliberation). McCall opts for a position like Popper’s (1972) by combining random quantum fluctuations in the brain with deterministic macro-controls. But if chance micro-events can only be turned into actions by deterministic screening mechanisms, it seems that we are back to a compatibilist position since on McCall’s view, given a set of possibilities that arise randomly, it is an entirely determinate affair which of these becomes actualized as an action. McCall’s position is that it is the random events that open up genuine possibilities of action in the first place, thereby rendering the determined decision free (1994, p. 275-6), but tenseless accounts of objective chance are possible (for example, Mellor 1971). Hence, genuine possibilities can be explained without recourse to tense.

\(^5\)It is of course common to claim that the past is necessary in that it cannot be changed while the future is contingent in that it can be changed. I explain this intuition by appeal to the direction of causation, not to an ontological difference between the past/present and future. That is, we can now affect the future but not the past simply because backward causation is unavailable, but forward causation is commonplace.
we have indeterminism without tense (see also Earman 1986). A robust conception of chance is not threatened by the tenseless account of time. Hence, anyone who views chance as necessary for freedom can remain comfortable with tenseless time.\footnote{The argument above can be easily marshaled against those such as Withrow who argue that quantum indeterminacy requires a dynamic conception of time. 'The past is the determined, the present is the moment of 'becoming' when events become determined, and the future is the as-yet undetermined' (Withrow 1961, p. 295, italics in original). However, quantum indeterminacy only requires indeterminism, which can be explained tenselessly; it does not require indeterminateness.}

12. Conclusion
I have argued that even if the future were perfectly foreknown, human freedom would not be ruled out because even divine foreknowledge must be construed as (causally) responsive to events. On the assumption that 'X Knows that p' entails 'p is true' and hence p (via the disquotational schema), it follows from the arguments of this chapter that the future could be fully determinate yet contingent. It may very well be that determinism or fatalism is true. Nevertheless, the tenseless theory of time does not commit one to either view.
The Cognitive Significance of Tense

1. Introduction

Our experience of time poses a challenge to anyone defending a tenseless ontology. In this chapter I deal with two issues concerning tense and our experience of the world. The first is the tense-theorist's contention that we are directly aware of presentness and the passage of time, and that this awareness is sufficient evidence for the reality of ontological tenses. I argue that this challenge can be met by appeal to the distinction between properties of events we perceive and features of the act of perception. The second difficulty is one that concerns our awareness of succession, something that the tenseless theorist posits as a substitute for our awareness of passage. The problem here is that there is difficulty coming up with a plausible physical correlate for succession. But if there is no physical correlate, then it is unclear that the time of physical and philosophical theory can rightly be taken to be a description of something existing objectively in the world.

2. Tensed Beliefs, Rational Action and the Passage of Time

I will use the phrase 'tensed beliefs' to denote mental states whose object (i.e. the proposition believed) is either identical with a tensed proposition or else merely equivalent to one (see chapter 3). I will, in other words, leave open the question whether these propositions are irreducibly tensed; nothing in what follows depends on coming to an answer here. I do, however, want to guard against confusing the psychological act of believing, say, that it is now $t$ from the object or content of that act. I am interested here in the objects of tensed beliefs, particularly their role in explaining human behaviour.
This is because, though *that it is now* \( t \) (believed at \( t \)) and *that* \( t \) *is at* \( t \) express either identical or logically equivalent propositions, belief in one can lead to very different courses of action than belief in the other (chapter 3). The explanation for this divergence can with justification be sought in some feature of the believer's intentional state, i.e. either in some difference in the *mode* under which the object of belief is apprehended in each case, or else in a difference in the object of belief (despite their logical equivalence).

One might think, on the other hand, that all that is really needed here is an account of the *causal* relations between a believer's various psychological states, in particular the causal differences between the psychological state corresponding to the belief that it is now \( t \) and that corresponding to the belief that it is \( t \) at \( t \). I do not mean to deny that some such causal story remains to be told. However, investigating the semantics of tensed beliefs is perspicuous because the contents of causally related mental states must in general have logical or semantic relations to each other. Otherwise, explaining behaviour by appeal to propositional attitudes would be unsuccessful, which it isn't (Fodor 1978). Hence, a study of the semantics of belief ought to be both enlightening and perfectly consistent with the causal explanations of behaviour that psychologists or neuroscientists might one day provide.

There is some support for locating the difference between believing that it is now \( t \) and believing that \( t \) is at \( t \) in the mode of presentation rather than the proposition believed. For instance, the numerous attacks on robust notions of *proposition* (such as in Quine 1960) have rendered it common to construe the objects of belief as, simply, truth conditions. If, however, the content of a belief is merely a truth condition, then the belief, at \( t \), that it is now \( t \) has the same object as the belief, held anytime, that \( t \) is at \( t \). Thus the difference between the two must be in the mode of presentation, understood, perhaps, as a difference in the manners by which one comes, in each case, to stand in the belief relation to a given truth condition. Having arrived at this state via different chains of reasoning
(and via different causal histories), one behaves differently as the case may be. For example, I believe that it is now \( t \) because I looked at a clock that reads 'r'. On the other hand, I believe that \( t \) is at \( t \) because I have learned enough logic to know it is a tautology. Thus, belief in a single propositions can be arrived at in different ways and hence can lead to different courses of action, different inferences, what have you. This is, perhaps (and given further detail), sufficient to explain what it is for beliefs in a single proposition to differ in their modes of presentation. (Though much more could be said concerning this issue, it would take me too far afield given the purposes of this chapter.)

Of course there is, on the other hand, the intuition that since one can believe that it is now \( t \) without even entertaining the thought that \( t \) is at \( t \), and vice versa, it is ludicrous to suppose that one somehow believes the latter in holding the attitude that we would describe as the former (see, for example, Stalnaker 1984). Furthermore, the notion of a mode of presentation remains controversial. Fortunately, my concern here is neutral with respect to this issue since my starting point is the need for tensed beliefs, not for a particular construal of them. In particular, I argue in what follows that this (neutral) need can help explain why we mistakenly think that time flows.

One cannot believe that it is now \( t \) without believing that 'it is now \( t' \) (or the appropriate translation into one's mother tongue) is true (I do not claim that these are identical propositions, only that one is logically committed to both or neither). But 'it is now \( t' \) is true at and only at \( t \); at all other times it is false. Hence, in virtue of knowing the meaning of 'now' one knows that (a token of) the tensed belief that it is now \( t \) is true at and only at \( t \). Because of this, tensed beliefs are cognitively useful in a way that their tenseless counterparts are not. Since our actions are caused by our beliefs and desires, we need beliefs that are known to be true only at certain times for our actions to succeed. If I want, for example, to attend a movie at \( t \), I need a belief that is true only at \( t \), and known to be true only at \( t \) (or slightly before), in order to be moved to act on time. The desire to
see the movie at \( t \) combined with the belief that it is now \( t \) will give rise to the appropriate action.

On the other hand, beliefs whose objects are irreducibly tenseless propositions, such as the belief that \( t \) is at \( t \), or the belief that an event, \( e \), is at \( t \), are temporally stable in that all their tokens share a truth value regardless of when they are held. Therefore, these beliefs cannot be used to time actions. For example, one may, all week, believe that the movie starts (tenselessly) at \( t \). Given one's desire to see the movie at \( t \), no token of this tenseless belief, presented in this way, will cause one to leave for the movie at the right time since it cannot be used to single out \( t \) the way the belief that it is now \( t \) can.

So knowledge of the linguistic meaning (character) of temporal indexicals, such as 'now', helps one not only to act on time but also to keep one's tensed beliefs true (indeed, the latter enables the former). In virtue of knowing the rule that 'it is now \( t \)' is true at and only at \( t \), one can keep one's present tense beliefs true by continually updating the value of the variable \( t \) to match the time of thought. While the meaning of 'now' does not change from one occasion of use to another, one expresses a different proposition each time it is used (i.e. uttered or believed) simply because the truth conditions of tensed sentences and beliefs are context sensitive.

That tokens of a single tensed belief type express different propositions helps to explain the pervasive supposition that time flows. Since we are constantly updating our tensed beliefs in order to keep them true, it can easily seem as if we are trying to keep up with a changing sum total of events. This combined with the ineliminability of tensed sentences and beliefs might seem to favour the A-theorist, but it does not. Tensed beliefs and sentences are needed because of our human need to act at some times but not others, not because there are ontological tenses. That one's tensed beliefs are held in succession is sufficient to explain the need for continual belief alteration.
3. Indexicality, Belief and Perception

Knowing that a tensed belief is true at one time but not others cannot be what causes one to act only when, say, the movie starts and not before or after. The knowledge that 'it is now t' is true at and only at t is not sufficient to allow one to recognize when it is in fact t. Since one knows at all times both that the belief that it is now t is true only at t and that in order to do something at t one must act only at t (i.e. when 'it is now t' is true), something in addition to these beliefs must be involved in successfully believing a moment or event to be now, something that only happens at a particular time (see also Millikan 1990). What is required is an explanation of our ability to be triggered at just the right time to believe that an event or time is now.

Craig argues that the B-theorist is unlikely to succeed in this endeavour,

On a B-theoretic ontology, all times are equally real. So why does it is 4:30 at 4:30 present itself as 'now' to someone and only to someone at 4:30? Why is the person tenselessly existing at 4:30 thus distinguished from his fellows? The obvious answer is that 'is presented' is not tenseless, but tensed, and there is a uniquely present moment, other times being . . . unreal. Because 4:30 really is present, the cognizer comes to believe that 'It is now 4:30', not just a tenseless proposition (Craig 1996, p. 257).

Note that there are two assertions here. The first is that the existence of a uniquely present moment (or, perhaps, a unique property of presentness) is required in order to explain why a time or event is apprehended as present at one time and not another. The second is the claim that the cognizer comes to believe a tensed rather than a tenseless proposition.

I will address Craig's first complaint first. Two suppositions will suffice to explain why we tend to believe that times and events are present when and only when they tenselessly occur. First, I take it as obvious that events in our physical environment cause perceptual experiences and, under normal circumstances, cause beliefs about our environment. Secondly, I assume that the range within which we generally perceive
events is quite small when compared to the distances light (or sound) can travel in extremely short times. Hence, the perceptual experience of an event and the event itself are effectively simultaneous (so long as our perceptual faculties are functioning properly). An important corollary is that for perceptual experiences in general, the experience of an event and our awareness (if any) of this experience are effectively simultaneous.¹

While some people have an uncanny ability to guess the time,² it is generally known by looking at a clock (or by noticing some event that is known to be simultaneous with a particular time). Since an accurate clock reads '4:30' at and only at 4:30, and since one generally says 'it is now 4:30', or has the tensed belief that it is now 4:30, only upon seeing a clock face that reads '4:30' (this is how we are taught to use tensed sentences and to form temporal beliefs), it follows that one will, in general, be caused to believe it is 4:30 at and only at 4:30 (assuming the clock is accurate, which is harmless). All that is required, then, for one to be able to tell the time is (i) that one's experience of the clock face reading '4:30' and the clock's reading '4:30' be effectively simultaneous and (ii) that one's learned ability to form the relevant present tense belief upon perceiving a certain event (the clock face reading '4:30') occur at effectively the same time as the act of perception. In sum, what is needed is that one's perception of the clock face reading '4:30' cause one to have the belief that it is now 4:30. Since our perceptions and the events perceived are simultaneous, it follows that one's now-beliefs concerning clock perceptions will generally track clock time.

So the ability to time one's actions is a combination of having the appropriate cognitive mastery of indexical beliefs (such as knowing when and when not to hold them) and the ability to perceive events as they (tenselessly) happen. If one plans to attend a movie at 4:30, one must commit oneself to acting when and only when 'it is now 4:30' is

¹There is surely some time lag in the brain's processing of perceptual information, but again the durations under consideration are so small as to be negligible.
²Since this skill is exceptional, I shall ignore it here in order to focus on the general case.
true (or, more typically, when and only when 'it is now t' is true, where t is some time that is slightly earlier than 4:30). This is because 'it is now 4:30' is true at and only at 4:30, which is the relevant semantic fact about 'now'. However, for one's actions to succeed, one must also be triggered to believe it is now 4:30 (and, therefore, that 'it is now 4:30' is true) at and only at 4:30. Being caused at 4:30 to believe that 4:30 is now, and knowing that '4:30 is now' is only true at 4:30, will suffice to move one to enter the theater on time. This story does not require recourse to tensed events or properties.

Our training around words such as 'now', 'present', 'currently', etc. is certainly intended to teach us to believe that an event is now, present or current when and only when we experience the event (or believe it to be simultaneous with some other event that we are experiencing). After experiencing an event, when it is merely remembered, we call it 'past' and believe it to be past. When we have no memory or experience of an event but anticipate it, we call it 'future' and believe it to be future. This story assumes that when one is aware of an event either in memory or anticipation it is distinguishable from one's actual perception of the event, but this is a plausible assumption. For instance, when an experience, E, is remembered, one generally is aware of experiences that have occurred later than E, which is not the case while E is (tenselessly) occurring. What, in general, distinguishes memories or anticipations of an event, at t, from one's experience of the event is that only at t is the event directly interacting with one's perceptual faculties. At later times one feels the causal traces of the experience while at earlier times one feels the effects of one's expectations.

It follows that at successive times one's memory is, in general, added to while one's expectations are realized. For example, at t_2 one remembers E_1, which occurred at t_1, experiences E_2 and anticipates E_3 at t_3. But then at t_3 one experiences E_3 and remembers E_1 at t_1, E_2 at t_2 and anticipates E_4 at t_4. Then, at t_4, one experiences E_4, remembers E_1, E_2 and E_3 at t_1, t_2 and t_3 respectively and anticipates E_5 at t_5. And so on. But this surely contributes to the feeling that time flows, especially when combined with
the fact that successive tokens of most tensed belief or sentence types change in truth value. There may be other features of our cognitive lives that contribute to the feeling that time passes, but the two canvassed above strongly suggest that a tenseless world containing agents who need to act and believe in a timely manner is a world that would naturally be mistaken for a tensed world.

4. Beliefs and Facts

I turn now to Craig's second objection, that a cognizer comes to believe a tensed rather than tenseless proposition upon coming to believe that 4:30 is now. There is no reason to deny this claim (though the object of belief might rather be a tenseless proposition presented under a tensed mode), but it does suggest a type of difficulty for tenseless time that has not yet been addressed. Consider the following,

beliefs too are facts . . . and insofar as tense necessarily enters into a description of such a belief, clearly there is no justification in claiming that all the facts about time can be expressed without ever making use of tense and hence that tense has no 'basis in reality' (Pivcevic 1990, p. 62).

If the B-theorist admits that tensed beliefs are necessary, then the claim that the world is devoid of ontological tenses cannot, it seems, be quite correct.

The A-theorist can strengthen the point by recalling Prior's famous 'Thank Goodness' argument (Prior 1959).³ When one says 'thank goodness that's over' after suffering through an unpleasant experience, one cannot, Prior argues, be thankful that the end of the experience is at \( t \), or that the end of the experience and the utterance coincide. Why should either of these be such a source of relief? After all, according to the tenseless account of time, it is always true, even during the experience, that the end of the experience is at \( t \), or that the experience and the utterance coincide. One may even be

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³Baldwin (1998) reminds us that C. D. Broad thought of the same argument over twenty years earlier than Prior (see Broad 1938, p. 267).
aware of this, yet only the pastness of the experience seems to alleviate the suffering (Prior 1959, p. 17). Both MacBeath (1983) and, following him, Mellor (1998) admit that in many circumstances we can only make sense of our mental attitudes (such as relief) by supposing that we believe that the pain is past, or something similar. One might, then, wonder about the ontological status of tensed intensions and whether a serious examination of them might lead to a previously unconsidered case for the reality of tense.

Put this way, the crux of this problem is the ontological status of subjective features of experience, or as Nagel puts it, 'how to combine the perspective of a particular person inside the world with an objective view of that same world, the person and his viewpoint included' (Nagel 1986, p. 3). Since tensed beliefs are most significantly needed in rational action, it is clear that the need for tensed beliefs arises from our nature as agents in the world, deliberators whose temporal perspective changes even if the sum total of events does not. But what has been said so far might nevertheless seem insufficient to dismiss the tensed, if subjective, character of our temporal experiences. What place are we obligated to find in our ontology for such features of cognitive life? This is what I take to be the heart of Pivcevic's and Craig's (second) objection to a tenseless ontology (for similar reasoning see Kiernan-Lewis 1991).

5. Tense and Temporal Perspective

According to the account of temporal experience that I have defended here, to be conscious, at a given time, that an event is present is to experience the event at that time and to be caused, at that time, to believe the event is present. Schematically,

\[(PE) \land \forall t \forall e \forall S((S \text{ is aware, at } t, \text{ that } e \text{ is present}) \leftrightarrow (e \text{ occurs at } t \text{ and } e \text{ causes } S \text{ to believe, at } t, \text{ that } e \text{ is now})).\]

\(^4\)(PE) holds when we substitute a mental experience, E, for event, e. To believe, while one is having an experience, that the experience is present is to be aware of one's experience as present. Since this is
The objection under consideration, then, is that since (PE) applies to all (or, at least, most) conscious experiences, it cannot account for the manner in which one's current experience is distinguished from the rest. To accept (PE) is to take an 'external' view concerning temporal experience, treating all such experiences equally, in one formulation. But, 'from the inside', a particular experience, the present one, is of particular and unique significance. Nagel writes,

>a tenseless description of the history of the world (including the description of people's tensed statements and their truth values) is fundamentally incomplete, because it cannot tell us which time is the present (Nagel 1986, p. 59).

So tenseless time cannot account for the fact that the event one experiences now is differentiated from all the rest simply because (PE) fails to acknowledge any significant difference between the current experience, yesterday's experience and tomorrow's experience; they each simply occur when they occur.

Nagel's general line of response to this type of difficulty is well known. He argues that theories cast in purely objective (what I have called 'external') terms are incomplete since there exist subjective properties (known, perhaps, through introspection) that cannot be captured by an objective description. The threat to tenseless time is that if tense is a genuine but non-objective property of the world (for example, of beliefs), then the ontological stance of tenseless time cannot be quite right, for the A-theorist can admit with Nagel that tensed properties are simply passed over by (PE).

I'll call this the 'Argument from Subjectivity' (AFS for short). It can be broken into two forms, one metaphysical, the other epistemological. The metaphysical version argues that there 'is something it is like' (Nagel 1974) to experience the presence of an

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something most people can do quite reliably, it follows that one is generally aware of all experiences as present.

5Of course, once this initial wedge is gained, the tense theorist might seek to extend the argument to a more robust notion of ontological tense, i.e. one that applies to time itself.
event, something that cannot be dismissed but is not captured by some objective analysis such as (PE). The epistemological version of AFS insists that one could know everything that (PE) captures and still not know what time it is. Hence, there are properties that can be known via experience but that are not captured by (PE) and these are, presumably, tensed properties.

Accordingly, let's give (PE) two readings. On the metaphysical reading, it says that what it is for an event to be experienced, at \( t \), as present is for the event to occur at \( t \) and for it to cause someone to believe, at \( t \), that it is now. On the epistemological reading, (PE) says that what one knows when one knows that an event is present is simply that the event is (tenselessly) at \( t \) and, if one is reflective, that one believes the event to be present at \( t \).

It is clear that the first version of AFS depends on the truth of the assertion that our experience of an event as present has some feature not captured by (PE). Quentin Smith, for one, defends this claim by arguing that the phenomenological character of our experience of time indicates that we can be aware of an event as present without being aware of any tenseless relation of simultaneity between the event and a time or thought.

Definitions such as these [(PE)] do not square with our many unreflexive awarenesses of events as present, past, or future; I perceive the cloud to be passing over the treetops at present without at the same time reflexively grasping my own perceptual experiencing of the event. I am not attending to my perceiving but to what I am perceiving, the cloud passing over the treetops. If somebody asks me, 'What are you experiencing right now?’, I may then reflect upon my perceptual state, but until then my attention is directed elsewhere (Smith 1988, p. 354, his italics).

Hence, experiencing an event as present cannot be the same thing as experiencing the event as simultaneous with a time or a belief token.

One problem with this argument is that Smith has not shown that when one is unreflexively aware of an event that one is nonetheless aware of it as present. Though he writes (at the start of the above quotation) of such unreflexive acts of awareness, the
actual example is of someone perceiving an event at present (i.e., at \( t \)). Is this person also unreflexively aware of the event as present? It is not clear that she is. Experiencing an event as present is, so far as I can tell, something over and above simply experiencing the event. In particular, it seems to require the formation of a tensed belief concerning the event. To be pulled out of one's unreflective (and, perhaps, unreflexive) state by the question, 'What are you experiencing now?', is precisely to engage in such cognitive activity. (Consider a person and a dog perceiving the same event. The person's ability to believe that the event is present plausibly distinguishes her experience from the dog's perception. I do not doubt that the dog experiences the event, but I think it is doubtful that she experiences it as present).

However, even if we grant Smith's claim that we can be unreflexively aware of an event as present, it does not follow that what one is aware of is anything other than the fact that the event and one's awareness of it are at \( t \), even if this is not how one is aware of it. The defender of the epistemic version of AFS would of course deny this (as does Hestevold 1990). But it is clear that one can be aware of some property of something without being aware that this is what one is aware of. For example, the experienced feeling of temperature is presumably our way of being made aware of the average kinetic energy of the molecules of some substance. One can be aware of the temperature without even knowing what kinetic energy is or what molecules are, but it does not follow that what one is aware of is anything other than average, molecular kinetic energy. It is useful, here, to recall the influential semantic theories of Putnam (1975) and Kripke (1980) that differentiate the referent, or extension, of a term from the meaning, or intension, of the term. Two concepts can be quite distinct yet refer to the same thing. Surely 'heat' and 'average kinetic energy' are terms that play significantly different cognitive and linguistic roles, yet they share a referent. Similarly, 'present' and 'at \( t \)' might differ in cognitive role yet the former need not designate some property of beliefs (or events) to which the latter fails to refer.
It is important to note that Smith provides no elucidation of the property that we allegedly notice when we see an event to be present. His argument is phenomenological, so he rests content showing that we must posit some tensed property fulfilling this role. Accordingly, it suffices for the B-theorist to provide a plausible explanation of why we believe we perceive this feature of events, even if such a property doesn't exist. Since the A-theorist's case must be that only a tensed theory of time can explain the phenomenology of temporal experience, an alternative account of this phenomenological aspect of experience (as in sections 2 and 3 above) is sufficient for the purposes of tenseless time.

What the proponents of AFS fail to notice is that (PE) really does explain why a certain experience, the present one, is singled out in our cognitive life. The reason is simply that only at $t$, when one has the experience, $E$, of perceiving an event, $e$, are the causal effects of $e$ (namely, $E$) felt. The fact that this is true of all such experiences does not entail that we cannot explain why each one seems, at the time at which it is had, to be differentiated from the rest. Since this response addresses the phenomenological and epistemological concerns raised by Smith, Craig, Pivcevic, Kiernan-Lewis and Nagel, it also addresses the metaphysical conclusions they wish to draw from our experience of time.

So the charge that (PE) is inadequate because it 'cannot tell us what time it is' is a non-starter. No analysis or formula can tell one what time it (present tense) is; one must look at a clock. Similarly, though (PE) does not tell us what time it is, it encapsulates our ability to tell the time, i.e. it explains how it is that we are able in general to know what time or event is present, and this is all that can be expected of an analysis of our experience of presence. Knowing how to tell the time is a skill one must learn, and though one learns a tenseless fact upon learning the time (i.e., the knowledge gained is knowledge of the tenseless world), one does so by employing one's abilities and training around temporal indexicals, tensed beliefs and perception. It is the conflation of the activation of our cognitive skills with the acquisition of new pieces of propositional
knowledge that leads to the erroneous conclusion that there are properties corresponding to tenses.

Finally, notice that even if tensed beliefs were to have genuine, tensed properties, it would not follow that time itself would be tensed in any way. Indeed, limiting tensed properties to our mental attitudes seems at best to support the claim that tense is a feature of our perspective on time, akin to a secondary quality (as Galileo conceived of them; see, for example, Grünbaum 1971). While tenses and secondary qualities may, for thinkers such as Nagel, represent a difficulty in integrating our conceptions of experience and the external world into a single, physical worldview, they represent no problem for our theory of the uncontroversially external parts of reality, of which time is certainly a part.

6. Temporal Perspective and the Truth Value Links
Michael Dummett is another philosopher who takes our temporal perspective seriously. Tense is an important issue for Dummett's general philosophical views because a tenseless theory of time is at odds with his semantic anti-realism. Dummett's semantic theory commits him to the following principle,

(MD) \( p \) is true \( \iff \) \( p \) is verifiable (perhaps in principle).

Dummett realizes that evidence for the truth of a claim is not in general permanent (Dummett 1969). Hence, a claim that is conclusively verified (therefore true) today might not be verifiable (even in principle) a year from now. For the anti-realist to secure her preference to keep truth and verifiability tightly connected, it seems that she will be forced to admit that statements that were once true can become false, and vice versa. But this seems to conflict with a set of very intuitive principles that link the truth values of the different tenses of a given sentence.

These truth value links capture equivalencies such as the following: \( p \) is true iff the past tense of \( p \) will be true; or, the future tense of \( p \) was true iff \( p \) is true; and so on.
The truth value links have often been taken to embody the 'timelessness of truth thesis' (Wright 1993, p. 177), i.e. the idea that if a sentence (token) or proposition is true, there is never a time at which it is false. But it is clear that the truth value links conflict with the transitory nature of evidence, and hence are not easily reconciled with (MD). Not only might evidence for \( p \) that is currently available be gone a year from now, there may, moreover, be evidence a year from now that such a loss has occurred (for example, one may notice something that suggests that written records and one's own memory have been altered). This not only renders a previously verifiable proposition undecidable, but convinces the Dummettian anti-realist that it is possible to be convinced that this sort of situation exists. Should she not, then, be tempted to sever truth from verifiability in deference to the truth value links?

I am indeed tempted to effect such a severance (see chapter 6). I bring up the issue here, however, to briefly examine Dummett's attempted reconciliation of the truth value links with (MD). He suggests that the anti-realist reject the timelessness of truth thesis,

> We can thus always say quite generally that a statement is true only if there is something in virtue of which it is true. But to say that we are in time is to say that the world changes; and, as it changes, so the range of even unrestricted quantifiers changes, so that that over which I quantify now when I say, 'There is something in virtue of which . . .', is not the same as that over which I shall be quantifying when I use the same expression in a year's time (Dummett 1969, p. 373).

In other words, anything we can now say concerning the truth of a past tense statement must reflect current reality and, therefore, the current state of evidence, and this is how the truth value links ought to be understood. 'True', notes Wright (1993, p. 192), becomes an indexical, along the lines of 'true now'. So, if the evidence that supported the assertion of \( p \) a year ago has disappeared, today's utterance of the past tense of \( p \) does not say the same thing as last year's utterance, and this is because the totality of truth conditions has
changed. As a result, even if today's utterance of the past tense of \( p \) is false, there is no conflict here with the claim that last year's utterance of the present tense of \( p \) was true since the different tenses alter the contents of the claims made in each case.

A number of points are in order here. First, the notion that the totality of truth makers changes is not worth defending, as chapters 1 and 2 above demonstrate. Hence, it is reasonable to favour a tenseless ontology over (MD). Secondly, Dummett's view renders the past and future more semantically inaccessible than is desirable, for on his view it is generally the case that two utterances of the same sentence type, altered only in tense, differ in content. However, I find it highly counter-intuitive to suggest that 'I am now at the store' said today and 'I was at the store yesterday' said tomorrow are not in general logically equivalent. Thirdly, it is clear that the tenseless theorist (who commits to the truth value links) can and does take our immersion in time seriously. Our perspective on time, which is responsible for the illusion that time flows, results from the fact that we are spatiotemporal creatures who have relations to times and who must act only at certain times in order to survive. In sum, Dummett's approach does not provide any compelling reason to reject the tenseless account.

7. Realism and the Perception of Succession: Entropy

I turn to another feature of temporal experience, the perception of succession. Though I deny that we experience the flow of time, it is not plausible to deny that we are aware of the continual succession of events. This is one of the most basic features of our mental experience. Indeed, the appeal to the perception of succession is a part of the above account of why we take ourselves to experience the flow of time (section 3). Let us, then, examine the issue of determining what it is (in the physical world) that we are perceiving when we notice one event following another.

The B-theorist has two general options here. She can, on the one hand, deny that time itself has any direction (it is no more asymmetrical than is a spatial line of points)
and instead locate the perceived directionality of time in some asymmetrical physical processes that occur in symmetrical time. On the other hand, she can argue that time differs qualitatively from a spatial line in that the timeline simply has an inherent direction, even though all its events are on an ontological par (the two issues, tense and directionality, are clearly distinct).

Consider the first sort of strategy. One popular suggestion here is to identify temporal order with an apparently irreversible physical process, such as increasing entropy which, the second law of thermodynamics tells us, can only occur in the direction of later times. On this view, what we perceive when we perceive one event, $e_1$, preceding another event, $e_2$, is the increased disorder (higher entropy) of the state including $e_2$ relative to the state including $e_1$. That is, for one event to be later than another is simply for the former to be part of a state having a higher degree of entropy than the state including the latter. Note that this is not to say that the manner in which we determine the order of events is by first determining such relative entropies and then inferring their time order. It is consistent with this hypothesis that our perception of temporal order is immediate and non-inferential. The point is that what we are perceiving turns out, upon empirical investigation, to be nothing more than relative entropic states.

But, as Sklar argues, the reduction of temporal order to entropy gradient will not apparently work,

We know from perception what it is for one state of a system to be temporally after some other state. And we know what it is for one state to have a more dispersed order structure than another state. We also know that these two relations are not the same (Sklar 1997, p. 224).

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4It has also been suggested that time order be identified with other irreversible processes such as the expansion of the universe (see, for example, the discussion in Mellor 1998, pp. 118-21). However, I shall confine my examination to the example of entropy as it is the most popular candidate.
It is quite conceivable that one could notice a state of high disorder evolving into a state of lower disorder without becoming confused as to the temporal order of the states. Therefore, to see one event following another is, quite simply, not to perceive the entropy gradient.

This conclusion can be avoided if one is willing to sever experienced time from physical time. But this severance comes at a heavy price for it suggests that the most fundamental parameter of physical existence escapes our grasp. As Sklar puts it,

> If what we mean by 'time' when we talk of the time order of events in the physical world has nothing to do with the meaning of 'time' as meant when we talk about the order in time of our experiences, then why call it time at all . . .? Instead let us freely admit that all we know about 'time' among the physical things is contained in the global theoretical structure in which the 't' parameter of physics appears. And all the understanding we have of that global structure is that when we posit it, it constrains the structure among those things presented to our experience in a number of ways (Sklar 1997, pp. 226-7).

The upshot is that a realist account of physical reality threatens to become impossible (a conclusion that would be welcomed by some but is, I believe, worth rejecting).

Is there any hope of rescuing the theory of time order as entropy gradient while remaining true to the spirit of a realistic metaphysics? One approach would be to argue against Sklar's claim that we in fact know that the relation of succession and the relation of increasing entropy are different relations, i.e. argue that they only appear to be distinct. This strategy would be similar to that pursued by some mind-brain identity theorists (such as Papineau 1995) when arguing against, for example, Kripke's claim that the brain could not be the mind (Kripke 1980). Kripke argues that mental experiences have certain phenomenological properties essentially but that brain states are such that it is possible that they lack any phenomenological character whatsoever. Therefore, brain states and mental states are not identical (indeed they cannot be identical since the modal property that brain states lack is an essential property of mental states).
The tack of Papineau (and others) is to attempt an explanation of why it *seems* that brain states and mental states differ with respect to their relations to the phenomenological features of experience, even though they are in fact identical states. That is, they suggest that brain states do indeed share all the (intrinsic) properties of mental states, and that the supposed differences are to be located in the different ways that we *conceive* of the two types of state. Similarly, the entropic theorist might want to try to explain away the intuition that we can conceive of temporal succession without increases in entropy (and vice versa) as inconclusive. She could, in other words, argue that every time an event is perceived to follow another event, the former is indeed part of a higher entropy state than the latter but that our ability to conceive of one without the other is akin to our ability to conceive of, say, a cloud without conceiving of tiny, suspended drops of water. It does not follow that clouds are anything other than collections of mist. Rather, what follows is that the cognitive significance of 'cloud' differs from that of 'suspended drops of water'.

This is plausible. Temporal concepts are some of the most basic of our cognitive life and are learned very early on. Entropic concepts, on the other hand, are generally learned later in life, if at all. It should not come as a surprise that the two sets of ideas play different cognitive roles thereby masking their identical extensions. Temporal concepts such as *later than* might be semantically more basic than concepts such as *higher entropy*, but this is consistent with the claim that the latter is the physical ground of the former (think, again, of the relation between 'temperature' and 'kinetic energy'). I will have more to say on this in section 9 below.

First, however, notice that even if Sklar's intuition can be dealt with in this manner, a problem remains for the entropic account of time. The second law of thermodynamics was classically put along the following lines,

(SLT) Any change occurring in an isolated system (i.e. one that does not gain or lose any energy) cannot cause its entropy to decrease.
It is not clear, however, that this can explain the apparent asymmetry of time without presupposing it.

Mathematically, entropy increase is proportionate to the amount of heat a system receives at a given temperature (for a nice discussion, see van Fraassen 1970, pp. 88-95). Because of the close relation between temperature and kinetic energy, it became desirable to seek an explanation of (SLT) in the terms of statistical mechanics. Accordingly, Ludwig Boltzmann’s statistical account of entropy increase gained wide acceptance in the late nineteenth century.

Consider the relation between a system's microstate (the position and velocity of each of its molecules) and its macrostate (temperature, pressure, volume). Boltzmann assumed that every microstate (every possible configuration of positions and velocities of a system’s micro-particles) is equally probable. It turns out that highly ordered macrostates can in general be realized by only a tiny fraction of a system's total microstates. Disordered macrostates, on the other hand, can be realized by many more microstates; indeed, the greater the macroscopic disorder the greater the proportion of microstates consistent with it. Hence, Boltzmann concluded that any change in a system will, with overwhelming probability, result in a state of higher disorder.¹

This is, however, insufficient to explain the apparent direction of time. Boltzmann’s reasoning shows that low entropy states are simply improbable, not improbable at one or the other end of the timeline. Hence, if at some time, t', a system, S, is in a low entropy state, E', it should be as improbable to find S in a lower entropy state, E, at t < t' as it is to find S in such a state at t'' > t. If a system is in an improbable, low entropy state, it remains, so far as Boltzmann’s explanation is concerned, even more improbable that the prior state will have lower entropy. As Reichenbach put it, statistical mechanics is time symmetric since it reduces to Newtonian mechanics, but at the micro-

¹For detailed examinations of Boltzmann, see Horwich 1987, Price 1996 or van Fraassen 1970.
level (Reichenbach 1956). Hence, it cannot rule out a process in one direction without ruling it out in the other direction. But if processes that result in states of increased entropy are allowed by Boltzmann's explanation, then so must be processes that result in states of lower entropy.

Reichenbach and philosophers such as Grünbaum (1963) and Horwich (1987) have, in attempts to render entropy a satisfactory basis for the apparent direction of time, supplemented Boltzmann's reasoning with certain assumptions concerning the initial states of low entropy systems or conditions at the Big Bang. Of course, for such strategies to work they cannot assume that the 'initial' conditions are initial in anything but a conventional sense (in other words, such conditions obtain only at one temporal end of a system, but not because it is earlier in time). However, what I want to draw attention to here is that the entropic account of succession carries with it some substantial and controversial physical commitments. Therefore, some may be inclined to look for another explanation of the perceived direction of time.

8. Realism and the Perception of Succession: Causation

According to the causal theory of time, an event, \( e_2 \), is later than an event, \( e_1 \), if and only if there is an actual or possible chain of causes from \( e_1 \) to \( e_2 \) (for a detailed discussion see Le Poidevin 1991). However, it is obvious that events that are not causally connected can be perceived to have a temporal order (for example, one turns off the radio then hears a thunder clap outside). Therefore, the adequacy of the causal theory is in doubt.

Mellor defends a causal account of temporal order, arguing that a time, \( t \), precedes a time, \( t' \), if and only if there is a fact, \( C \), that is in part about \( t \) that causes a fact, \( E \), that is

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8 As Price 1996 emphasizes. Price therefore argues that the Big Bang is not objectively the 'start' of the universe since time itself is symmetric. Hence, he concludes that were the universe to collapse towards a 'Big Crunch', the entropy gradient (and hence the perceived direction of time) would be reversed.

9 For further doubts concerning the causal theory, see Sklar 1985.
in part about $t'$ (Mellor 1998). Mellor explains how we are able to perceive causally unrelated events as temporally ordered,

each point of spacetime is the location of many facts, e.g. about density, curvature, pressure, temperature, the intensity of gravitational, electromagnetic and other fields, etc., all of them related causally to some other facts at other points. So all we need, for causation to fix the time order of any two spacetime points . . . is . . . that some fact $C$ at $t$ causes some fact $E$ at $t'$, thereby making all other facts at $t$ also precede all other facts at $t'$, whether they cause those later facts or not (Mellor 1998, p. 113).

Mellor's account allows him, furthermore, to explain how our perceptions reliably track temporal order. Suppose some event, $c$, occurs at $t$, while another event, $e$, occurs at $t'$ (this order being fixed by the causal relation between some fact, $C$, about $t$ and some fact, $E$, about $t'$). To perceive $c$ is to have $c$ cause a perceptual experience, $pc$. Similarly, to perceive $e$ is for $e$ to cause a perceptual experience, $pe$. If $e$ follows $c$, then one will (in the general case) perceive $e$ while remembering one's perception of $c$. In other words, $pc$ will affect $pe$. Since $pc$'s causally influencing $pe$ entails that $pc$'s time precedes $pe$'s time, it follows that perceived temporal order tracks objective temporal order (Mellor 1998, pp. 114-15).

It might, at first, seem strange for Mellor to suggest that when we perceive two causally unrelated events, such as the turning off of a radio and a subsequent thunder clap, in some order, that this order is fixed by some facts about, say, the mass density inside one's living room and that in the forest outside one's window (where the lightning struck). There is some natural resistance, I would suspect, to the claim that what we perceive in this case is any relation between such obscure facts. Nonetheless, it remains possible that, though this is not how we conceive of the perceived relation of succession, the physical basis of the relation is in each case some causal relation between some pair

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10Mellor considers causation to be a relation between facts rather than events for reasons I shall bypass here.
of perhaps obscure facts. Still, until a detailed physical explanation along these lines can be worked out, Mellor’s account amounts to a promissory note.

Moreover, the causal theory suffers from a difficulty similar to that which plagues the entropic account. If Mellor wishes to reduce temporal relations to causal relations, then presumably the latter must be susceptible to elucidation in terms that neither employ temporal concepts nor presuppose temporal relations. But this is precisely what the causal theory seems incapable of doing. Assuming, as Mellor does, that causation cannot relate simultaneous facts (it certainly cannot relate simultaneous facts exclusively), it follows that facts must be about distinct times in order to be causally related (similarly for events: they must occur at distinct times if they are to be causally related). However, if distinct times exist, then they are related by earlier/later than since all non-identical times are related in this way. So, to claim that facts (or events) are causally related, one must presuppose the existence of times and temporal relations (Hume would have expected this as he analyzed causation as a regularity of succession). Therefore, the causal theory of time cannot explain temporal order, it depends on it.

A final problem with Mellor’s causal theory of time is that causal order fixes temporal order only if simultaneous and backwards causation are impossible. Though causation between simultaneous events may be ruled out by Special Relativity (it is far from clear that it is), backward causation remains a live possibility (and is defended ably in Horwich 1987 and Price 1996). In particular, if some fact, F, which is about t, can cause some fact, G, which is about t' (t' > t), it is hard to see why there can’t be some other pair of facts, F* and G*, about t and t' respectively, such that G* causes F* rather than vice versa. Given the time-reversal invariance of physical laws, it seems reasonable to suppose that some gravitational fact about t could cause some other gravitational fact about t' while some electro-dynamic fact about t' could cause some electro-dynamic fact about t. It would help to see an explanation from Mellor as to why this couldn’t occur.
Nonetheless, even if time order cannot be reduced to causal order, it is impossible to deny that causal interactions are overwhelmingly directed towards later times. Hence, causal order will be a reliable guide to temporal order even if distinct from it. Therefore, anyone who rejects the causal theory of time can accept Mellor's account of temporal perception and remain a robust, external world realist.

9. Realism and the Perception of Succession: The Non-Reductive Strategy

Let us consider non-reductive accounts of temporal succession, i.e. views according to which time has an inherent direction and so differs qualitatively from space (see Oaklander 1984). On such views, the temporal relations between any two events cannot be analyzed in terms other than earlier than, later than, or simultaneous with. These terms refer to the ontologically basic relations that we perceive when we notice the temporal ordering of events. There is, therefore, no physical correlate for time (other than time itself).

Such a view has interesting strengths. First, unlike a reductive account, it does not have to worry about explaining the perceived direction of time without assuming it. Non-reductive accounts take the direction of time to be a basic feature of the universe and, therefore, take the B-relations to be primitive concepts that should not be elucidated but, rather, used in the elucidation of other concepts. Secondly, it is consistent with external world realism. Thirdly, it is neutral between relational and substantive accounts of time. The basic, non-analyzable temporal concepts can correspond either to relations between events or to parts of a substantial spatiotemporal continuum in which events are embedded. In either case, the concepts can be primitive and the relations ontologically basic. Fourthly, there is nothing in the non-reductive strategy that should offend philosophical 'naturalists'. If we take naturalism to be the view that the only legitimate ontological categories are those that figure in natural laws, then it is clear that time, understood as an ontological primitive, denoted by the variable 't' in physics, fits the bill.
Notice, moreover, that the A-theory of time fares no better than the non-reductive B-theory in accounting for the apparent direction of time. Tensed accounts of time tend to explain direction by appeal to the movement of the NOW, i.e. some property of presentness. It is taken for granted that the NOW moves to future rather than past times. Therefore, the A-theorist's position is no less (though no more) *ad hoc* than is the non-reductive B-theorist's.

What is less clear is how well the non-reductive B-series accounts for our ability to reliably perceive temporal order. Since any two events that are related by *earlier than* are also related by *later than*, if these relations were the objects of our perception of temporal order, it is not obvious that we would be able to distinguish the two relations. If \( e_1 \) is earlier than \( e_2 \) by, say, one second, then \( e_2 \) is later than \( e_1 \) by one second (and vice versa). How, then, do we figure out that \( e_1 \) is the earlier event, if both relations are perceived if either one is? If recourse to causation or entropy is required to explain how we determine the earlier or later of two events, then the motivation for the non-reductive view is significantly lessened.

Furthermore, some may find the non-reductive picture too neat and tidy to be trusted. It might be thought that finding an objective, physical correlate for the perceived relation of succession *ought* to be the sort of hard work that incurs the burden of justifying substantial philosophical and physical commitments; after all, a deep and important problem is under consideration here. However, it is clear that if no plausible physical relation can explain all the perceived features of time, then opting for a theory of time as a basic ontological feature of the world is simply good policy, given the undesirability of absolute idealism.

Now it may seem to some Davidsonians that there is no real tension between reductive and non-reductive accounts of succession. They might suspect that there are two issues here that have been conflated: (i) the proper explanation of the logical form of temporal sentences; and (ii) the analysis of succession itself. Consider Davidson's views
on causation. He argues (Davidson 1967) that it is possible to combine Hume's insight that causation involves the instantiation of a law relating events with Ducasse's observation that we can know a singular causal statement to be true without knowing the relevant laws. Though any true causal statement entails that the events referred to are related by a strict law, the statement may refer to the events in such a way that the appropriate law is not evident,

we must distinguish firmly between causes and the features we hit on for describing them, and hence between the questions whether a statement says truly that one event caused another and the further question whether the events are characterized in such a way that we can deduce, or otherwise infer, from laws or other causal lore, that the relation was causal (Davidson 1967, p. 697).

One description might be more salient than another for explanatory purposes even if the latter would render the laws clear. For instance, we might be interested in explaining the 'tragic destruction of a house' by reference to the 'crash of a fiery meteor'. These same events would not be so described by, say, the science of mechanics, the field that is best suited to formulate the precise causal laws.

The analysis of 'causes', Davidson concludes, shows that it is 'an ordinary two-place predicate in an ordinary, extensional first-order language' (Davidson 1967, p. 702). It is extensional because the causal relations between events do not depend our descriptions of those events. Hence, causal statements don't change in truth value if coreferring singular terms are substituted into them. Laws, on the other hand, are linguistic (i.e. intensional) so they do depend on how we describe events. However, just because the relevant law relating two events only applies to the events under a particular description, it does not follow that alternate descriptions, which might not be related nomologically, fail to pick out the causally related events. Therefore, it is possible to truly say that events whose nomological relations are unknown are causally related. However, the analysis of causation is a different matter, one that may very well involve
conceptual resources outside the scope of the logical analysis of causal statements. As these are separate issues, such differences can be cheerfully combined.

Similarly, one might find it quite intelligible to argue that a sentence of the form,

(1) $e_1$ is earlier than $e_2$

can be known to be true even though the relevant entropic, causal, or other physical relations between $e_1$ and $e_2$ are unknown. Though sentences such as (1) are not susceptible to further logical or semantic analysis, and so cannot be elucidated in other terms, the analysis of succession might very well show it to consist of some physical relation such as entropy gradient or causation. This would certainly address Sklar's concern that we can conceive of temporal order without increase in entropy. Our conceptions of time, one might plausibly argue, are based on the semantic features of temporal terms; physics, on the other hand, clarifies the nature of the referents of these terms, and the two stories need not be identical. It is not my intention here to work out a Davidsonian approach to temporal relations but I do want to note that a respectable philosophical position exists that suggests that the choice between reductive and non-reductive accounts of succession can be resolved in a way that preserves the insights of both.

I want, finally, to point out that no matter how one responds to the problem of temporal succession, recourse to ontological tenses is unlikely to help. For one thing, relations such as entropy and causation (the two most popular physical grounds for succession) can be fully explicated without employing the resources of the A-theory of time. Moreover, as noted above, the attempt to explain succession in terms of the movement of the NOW does not truly constitute an explanatory step forward. Though succession may give the B-theorist some problems, they are not the sort of problems that suggest relinquishing tenseless time.
10. Conclusion
I have examined two important features of the experience of time. The A-theorist's contention that we are immediately aware of presentness and the passage of time has been deflected by appeal to the difference between the events that we perceive and certain features of perception (in particular, our cognitive and perceptual skills). Since the A-theorist's charge is that the B-theory cannot account for our experience of time, the mere coherence of a tenseless account of such experience is sufficient to block the A-theorist's challenge. Another characteristic of our temporal experience is our awareness of the succession of events. This is a feature of experience that cannot be explained away, yet it poses a challenge to the tenseless theorist, especially one who wishes to remain a realist about the external world. Fortunately, however, these difficulties are not more easily handled by the A-theory and so even if they remain unresolved, they do not suggest abandoning the tenseless theory of time.
1. Introduction

A number of philosophical traditions maintain that truth is an epistemic concept and, therefore, that any discussion concerning reality must be constrained by the epistemic facts, i.e. considerations such as what evidence is or could be available, what our epistemic limitations are, the nature of inquiry, and so on. Epistemic accounts of truth also suggest the denial of the principle of bivalence. Such a stance, if correct, would be damaging to the arguments of previous chapters where I have afforded logical priority to metaphysical considerations concerning the status of tense, letting them determine subsequent epistemological discussions. In this chapter I argue that epistemic constraints on truth are implausible and poorly motivated (and therefore cannot justify paying the heavy price of revising classical logic). To keep the discussion focused I shall concentrate on the most popular epistemic theory of truth currently in play: pragmatism. However, since the features of pragmatistic truth that I shall investigate are, in one form or another, at the root of most epistemic accounts of truth (such as verificationism and coherentism), the discussion shall be broadly relevant. The upshot of the investigation is that epistemic truth entails unattractive ontological conclusions.

2. The Conflict

I take pragmatism and epistemic theories of truth in general to be committed to the following principle,

(ET) Truth is a kind of warrant, justification, or other epistemic virtue of statements, beliefs, propositions, etc., and 'true' is to be analyzed in
A proposition, $P$, is true because $P$ is warranted under certain epistemic conditions (to be specified).

Contrast this with ontological realism, the belief that, ontologically speaking, reality is independent of human minds,

(OR) The world is composed of entities whose existence and nature are constitutively independent of the structure and content of human propositional attitudes. A proposition, $P$, is true in virtue of the way things are independent of our minds, how we verify $P$, and so on.

If we accept the rather platitudinous suggestion that true statements or propositions 'accurately portray things', 'get things right', 'report the facts', etc., then (ET) and (OR) conflict. After all, whether something is or could be warranted, justified, etc., is something that depends on our evidence gathering capacities (perhaps in some idealized sense of the phrase). Hence (ET) entails that the set of true judgments is necessarily delineated by the limits of our human capacities for investigation. But if true judgments and reality are coextensive, as the above platitudes suggest, then the world is not really independent of contingent features of human knowers.

Profound complications lurk beneath this simple train of thought. The epistemic theorist need not, for example, be forced by the above reasoning into the admission that reality is (constitutively) mind-dependent. She could opt instead to separate truths from facts (reality) and argue that while all truths are constrained by epistemic considerations, reality is not and therefore potentially outruns the set of true statements. But this would

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1. This qualification is intended to allow for the obvious and unproblematic dependence of many objects on human minds. For example, radio towers, combustion engines, microwave ovens, and so on, are the sorts of objects that would not exist were it not for the activities of human beings whose actions are guided by their beliefs. Call this existential dependence (i.e. the objects only exist because of human intervention) and contrast it with constitutive dependence (intuitively, the suggestion that an object's properties require human thought in order to persist or endure). Hence objects can be (existentially) mind-dependent as well as (constitutively) mind-independent. This intuitive distinction will suffice here, though admittedly the issue is extremely subtle and complex.

2. I will use 'warrant' when I wish to refer to epistemic virtues in general.
be outside the spirit of epistemic accounts of truth which are commonly put forth in an attempt to secure us from skepticism not plunge us into its depths. Moreover, this move is in tension with (ET) itself for if there are epistemically unconstrained facts, then there are epistemically unconstrained truth conditions (I assume, as I did in chapter 3, that facts just are truth conditions). But if so, then there could be unknowable (potential) truths. So the epistemic theorist is once again moved to delimit reality on the basis of epistemic considerations.

Finally, it is commonplace to take the relationship between truth and realism to be intimate. Consider the following,

Wherever it is found, I'll argue, realism involves embracing just two theses: (1) the claims in question, when literally construed, are literally true or false (cognitivism), and (2) some are literally true. Nothing more (Sayre-McCord 1988, p. 5).

One of these perspectives is the perspective of metaphysical realism. On this perspective, the world consists of some fixed totality of mind-independent objects. There is exactly one true and complete description of 'the way the world is'. Truth involves some sort of correspondence relation between words or thought-signs and external things and sets of things (Putnam 1981, p. 49).

Realism I characterise as the belief that statements of the disputed class possess an objective truth-value, independently of our means of knowing it: they are true or false in virtue of a reality existing independently of us (Dummett 1963, p. 146).

Similar statements are not hard to find in recent philosophical literature. Therefore I shall assume that the epistemic theorist takes it as given that features of truth bear directly on realism/anti-realism debates thereby influencing ontological disputes.

Some have doubted the validity this move. Philosophers such as Devitt (1997, pp. 39-59), Horwich (1982) and Kirkham (1992, pp. 73-118) have argued that there is more elbow room between one's theories of truth and ontology than is commonly supposed.

\(^1\text{Some further examples can be found in Devitt 1997, pp. 39-40.}\)
Hence the currently popular strategy might very well be misguided. Though I agree that the connection between truth and ontology is looser than is usually assumed, it turns out that ontological considerations do have certain ramifications for one's theory of truth (I am more suspicious of the converse claim), as shall become apparent below.

3. Motivations for Epistemic Truth

Many philosophers, including Crispin Wright (1992), Hilary Putnam (1981) and Cheryl Misak (1991, 1998), take there to be a close connection between truth and warrant and see this as providing support for an epistemic conception of truth. This has the added advantage, it is usually supposed by epistemic theorists, of keeping truth 'our' concept, i.e. a concept that represents something accessible to us, something that can be of cognitive service. However, no matter how strong one considers the ties between truth and warrant to be, everyone wishes to avoid the implausible equation of truths with those statements that happen to be warranted here and now. Hence, the epistemic theorist must construe truth as some sort of idealization of warrant in order to preserve the possibility of justified yet false and true but unjustified propositions.

Putnam, for example, reasonably argues that truth has a stable (as he calls it, a 'timeless') character that warrant lacks. This, he claims, shows not that truth is radically non-epistemic (since human beings are far from timeless) but that truth is an idealization of what he calls 'rational acceptability' (Putnam 1981, p. 55). Truth is what rationally ideal agents would accept upon ideal investigation into an issue. This is a type of pragmatism whereby truth is the 'upshot' of our inquiry, a final product that is stable and eternal in virtue of being a product that could not be improved upon.

Wright, on the other hand, rejects the idea of an ideal limit of inquiry. Instead, he suggests we cash out truth in terms of what he calls 'superassertibility'.

\[\text{\textsuperscript{4}}\text{Supraassertibility is the truth predicate only for areas of discourse where it is necessary that a proposition is knowable if it is true. Of course, semantic anti-realists will think that this condition applies globally.}\]

\[\text{\textsuperscript{4}}\]
superassertible if and only if warrant for it is available, and at least some warrant for it would survive any improvement in our state of information (Wright 1992, p. 48). So, rather than idealizing the inquiry, Wright idealizes the endurance of the justification thereby managing to keep truth epistemic yet distinct from current justifiability.

Misak elucidates and defends a form of pragmatism that is strongly in the spirit of Peirce's own formulations. True sentences, Misak argues, are those that would be agreed upon were inquiry pursued as far as it could fruitfully be pushed (Misak 1991, ch. 1). This is a counterfactual analysis of truth, which allows Misak to hold that statements might be justified here and now but false (since inquiry would ultimately count against them) and that true statements might not be currently justified. She places limits on the counterfactual powers accorded inquirers: they are not allowed time machines, superhuman sensory faculties, and so on. This is to make sure that truth is connected with our actual practices and modes of inquiry for otherwise it threatens to become some sort of alien concept (Misak 1998).

These emphases on analyzing truth in epistemic terms indicate that the desire to keep truth a concept that designates something cognitively accessible and thereby useful is close to the heart of pragmatism and other epistemic theories of truth. Of course there is in addition the advantage that epistemic accounts promise to undercut skepticism, as noted above. However, before examining the relation between truth and accessibility, I want first to look at the tension between epistemic accounts of truth and classical logic.

4. Epistemic Truth and Bivalence

(ET) conflicts with (OR) in more ways than one. Since our evidence gathering capacities are limited (even when idealized), it follows that for some proposition, neither it nor its negation will turn out to be justified even after ideal inquiry into the matter reported on by the statement in question; at least, the epistemic theorist is forced to countenance this possibility. But if truth is to be spelled out in epistemic terms, then we can conclude that
(ET) forces us to accept the claim that some well-formed, precise statements could be neither true nor false, i.e. that the classical law of bivalence fails.

This is *prima facie* a serious blow to (ET). After all, if $S$ is a well-formed, declarative statement, then the condition that $S$ asserts to obtain either obtains or doesn't. The world, one who is influenced by (OR) is tempted to say, is fully determinate despite the possibility that our limited epistemic capacities constrain what we are able to determine to be the case. Since, as I noted above, the epistemic theorist is unlikely to sever truths from facts, it follows that the epistemic theorist is committed to the claim that the world might be indeterminate, and that its indeterminacies map precisely onto our (idealized) limits of evidence gathering. This is a striking conclusion.

In what follows I focus on Misak's attempt to deal with this issue for she addresses it directly. She puts forth a two-pronged attack. First, she follows Peirce and suggests that bivalence is a 'regulative assumption of inquiry' (Misak 1998), not a logical truth. Bivalence is something that one *assumes* prior to any inquiry simply because if one didn't believe that a question was going to be determinately answered by investigation, then one would have no motivation to engage the issue.

Second, she argues that it is quite reasonable to believe that bivalence in fact fails of many classes of statement, hence the demotion of the principle to regulative assumption from logical law has significant support. She presents four examples of potentially non-bivalent classes of statement: (i) those containing subjective and other similarly problematic predicates; (ii) those that are underdetermined by evidence; (iii) vague claims; and (iv) the liar paradox. However, I argue in what follows that since none of these examples provides a decisive case in favour of revising classical logic, we are justified in our continued refusal to pay the heavy price of denying the principle of bivalence. The problem, to anticipate, is that Misak's general approach begs the question against (OR) by taking it for granted that epistemic uncertainties indicate that reality is indeterminate. After all, even the adherent of (OR) can admit that epistemic perplexities
may result from our finite nature; she accepts this as inevitable even in a determinate, bivalent world. So let us examine Misak's four cases in turn.

5. Predicate Specification

Consider, for a particular food item, $x$, a claim such as,

$$ (1) \ x \ \text{tastes good.} $$

Misak suggests that this sentence might be neither true nor false (Misak 1998, p. 416). But how could this claim be justified? Presumably not by pointing out that there is what appears to be interminable disagreement as to (1)'s truth value, for this has often been the case with statements that are in fact determinate. To assume that disagreement entails truth value indeterminacy is to assume that epistemic considerations determine ontological considerations which is precisely the question at issue.

The most plausible explanation of the disagreement over (1) is that taste is a subjective quality that is neither good nor bad absolutely since it is the result of an interaction between a person's senses and the chemical qualities of a food, an interaction whose result (a taste experience) differs from person to person. But in that case (1) ought to be written as,

$$ (2) \ x \ \text{tastes good to P} $$

which is quite determinately true or false. It is true if (and only if) $P$ enjoys (overall and at that time) the taste of the food under consideration, false if (and only if) $P$ doesn't. And it can be quite determinate whether something tastes pleasant to someone at a given time, no matter what others think of that food.

On the other hand, one might suggest that 'good' be used in an inter-subjective sense, like, 'pleasant to everyone' or 'enjoyed by most', but in that case, the speaker of (1) is simply making a false statement, unless everyone or almost everyone happens to like $x$,
in which case the statement is true. Or, it could be argued that (1) makes the claim that $x$ ought to be enjoyed by all. However, this is a dubious statement that would only be true if there were some moral or other normative consideration compelling the enjoyment of $x$. If such a reason exists, then (1) so understood is true; if not, it is false. In either case, bivalence seems not to be threatened by such statements. The lesson here is that predicates must be fully specified before sentences containing them can be evaluated for truth; suppressed indices and other forms of potential confusion must first be eliminated, but once this is done subjective predicates seem to offer no reason to revise classical logical principles such as bivalence.

Misak does suggest that the speaker of (1) could refuse to index her statement in which case a response such as mine must insist that the speaker misunderstands the meaning of her claim, a dubious proposition to be sure (Misak 1998, p. 416). However, in the case of subjective predicates concerning our evaluations of tastes, smells and the like, I should note that I am not being cavalier in my suggestion that (2), despite the speaker's protestations, is in fact the correct way to understand (1). After all, there is an important philosophical and scientific tradition of argument in favour of relegating all such qualities to our subjective experiences of the world. Philosophers such as Galileo, Descartes and more recently, Boghossian and Velleman (1989) have argued persuasively for this view. Hence, the justification for eliminating claims such as (1) in favour of claims such as (2) is simply the evidence in favour of the scientific reduction of tastes, smells, etc. to subjective (possibly intersubjective) properties, not a reworking of ordinary language simply to support a particular philosophical commitment.

6. Underdetermination: The Topology of Time
That the current body of evidence available does not allow us to decisively determine the truth or falsity of a claim is insufficient to justify the denial of bivalence or (OR) since the relevant information might yet come in (as the epistemic theorist allows). The thorny
issue is that of underdetermination in principle. Misak's example of something that might be a case of such underdetermination is the claim that light is a wave (Misak 1998, p. 417). Since light behaves in both 'wave-like' and 'particle-like' ways depending on how one interacts with it, the claim that it is in itself either one might be neither true nor false. She is of course not the first to suggest that Quantum Mechanics provides support for the claim that some statements are neither true nor false (see also Wright 1992, p. 39). However, the attempt to interpret Quantum Mechanics invariably entangles one in profound complexities, so I shall leave the necessarily detailed consideration of the micro-realm to the appendix below. Instead, I shall focus on an example of underdetermination due to Newton-Smith (1980) that concerns the topology of time.

Newton-Smith asks us to consider two possible worlds, A and B. In A, time is open and history is cyclic. Open time is best represented by a line extending infinitely in both directions while cyclic history means that within this timeline all events are repeated regularly; say, for example, that every one hundred trillion years a distinct but qualitatively identical ordering of events repeats itself, ad infinitum. In B, however, time is closed. Closed time can be represented by a circle, with each event in its history occurring once at its particular time. B's history is, however, qualitatively identical to each one hundred trillion year historical cycle in A (Newton-Smith 1980, pp. 57-66).

Newton-Smith points out that any evidence one might have for the hypothesis that our world is A counts equally for the hypothesis that our world is B (I will follow Newton-Smith and call the two hypotheses $T_1$ and $T_2$ respectively). For example, both hypotheses entail that the future will qualitatively resemble the present, but $T_1$ claims that the time of a qualitatively identical future state will be distinct from the time of the present state, while $T_2$ insists that that time is in fact the same moment as the present (Newton-Smith 1980, p. 67). Since the future and past relative to any moment of time are qualitatively identical, there is no evidence that could possibly favour $T_1$ or $T_2$. However,
the two temporal structures are clearly distinct since there is no one-one mapping of one onto the other (Newton-Smith 1980, p. 68).

The relevant problem is how to draw conclusions from cases like this for epistemic truth. Newton-Smith claims that there are two possible responses to his scenario. First, there is the Ignorance response, which asserts that a proposition such as our world is world A (B) is bivalent and though we may never know its truth value it is quite determinate; hence there can be unknowable facts. On the other hand, the Arrogance response suspends bivalence (and the law of excluded middle) whenever a proposition is empirically undecidable (Newton-Smith 1980, pp. 232-3). Though Newton-Smith prefers the Arrogance response, he realizes that this commits him to the thesis of the 'essential accessibility of facts or TEAC' (Newton-Smith 1980, p. 233). This is precisely the improbable claim I alluded to above (section 4). Moreover, Newton-Smith admits that it plausible for the realist to adhere to the Ignorance response, its primary drawback (in the case of his example) being that in admitting that there might be unknowable temporal facts it renders time somewhat mysterious and intractable (Newton-Smith 1980, p. 238). Not only does Newton-Smith admit that time might simply be mysterious, he makes no pretense of arguing against the possibility of inaccessible facts; he simply presents it as in conflict with his preferred, Carnapian approach to ontology (Newton-Smith 1980, pp. 239-42).

For present purposes, however, the coherence and plausibility of the inaccessible fact response is sufficient, for I am interested only in defusing the epistemic theorist's case; if she has no direct argument from underdetermination to constraining ontology as she does, and an opposing ontology is in play, then it seems that considerations other than underdetermination (even in principle) shall have to settle the score (if, indeed, the score can be settled). For example, in Newton-Smith's case the discussion will certainly center on the merits of Carnap's ontological methodology (a question that certainly deserves its share of attention). However, such an investigation is beyond the scope of this chapter so
I shall rest content with Newton-Smith's concession that the Ignorance response remains a live possibility even in the face of underdetermination.

7. Vagueness

Vague statements form a complex issue, but a few remarks will be helpful. A popular means of dealing with vagueness has been the production of 'fuzzy logics' that allow for gradations of the truth predicate. So, while a statement like,

(3) \( x \) is tall

may not be true or false \textit{simpliciter}, it is, on these theories, true or false \textit{to a certain degree} (Lakoff 1973). To take Lakoff's example, if John is tall to degree 0.7, then 'John is tall' is true to degree 0.7 and 'John is not tall' is true to degree 0.3, i.e. \( 1 - 0.7 \) (Lakoff 1973, p. 464). This account is not bivalent so it is a candidate for acceptance by epistemic truth theorists.

However, the graduated character of the predicate 'is tall' need not transfer to the predicate 'is true'. Indeed, it remains quite reasonable to deny this. Rather than claiming that 'John is tall' is true to degree 0.7, why not, instead, claim that 'John is 0.7 tall' is \textit{true} (\textit{simpliciter})? Similarly, rather than 'John is not tall' is true to degree 0.3, we write 'John is 0.3 not tall' is \textit{true} (\textit{simpliciter}). Nothing in this strategy seems, to me, to tax our intuitions concerning the fuzziness of certain \textit{concepts}. \textit{Tallness} is a fuzzy concept that admits of degrees of application. However, for any person and any time, she has the height she has at that time, and whatever the value of tallness corresponding to that height at that time,\(^3\) the statement asserting that degree is true, and its negation is false. We leave, then, the predicate 'is true' without a prefix to acknowledge the determinate

\[^3\]That is to say, 'John is 0.3 short'.
\[^4\]Since our standards change, this is likely to be a shifting evaluation. What won't change, however, is the numerical value (in a given system of units) of John's height at a particular time.
character of reality. Hence bivalence and the law of excluded middle are preserved. For example, 'John is 0.7 tall' is true (if and only if he is in fact of the corresponding height) or false (if and only if he is any other height); and "'John is 0.7 tall" or "John is not 0.7 tall" is necessarily true.

Of course none of the preceding proves that vagueness could easily be eliminated from language, nor does it suggest that this would be generally desirable. Vague predicates are used successfully in natural language so there is no compelling reason to dispose of them. However, our success in employing vague terms is easily combined with the thesis that the world is fully determinate. We are able to use vague terms because, for the purposes of everyday discourse, precise pronouncements on such things a person's height, the number of hairs on someone's head, or the colour shade of an object's surface are more fine grained than we require for successful communication. Often enough, imprecise specifications are sufficient, and, indeed, efficient means of getting the point across. Rough characterizations of colour, amount of hair, height and the like, are helpful since they are easily integrated into conversation. In order to pick out a bald or balding person from a crowd (say, in order to draw someone's attention to him), it is enough that one's words single him out, and this rarely requires an exact count of the hairs on his head. If our abilities to perceptually discriminate features of the world are relatively coarse, then it is unsurprising that predicates that are less fine grained that they could be suffice for communication. This is no threat to the thesis that the world is entirely and mind independently determinate.

So it unsurprising that imprecise terms have evolved in our language. As long as the balding man's head stands out perceptually (to us) from those around him, 'bald' will pick him out (even though it can also be used to pick out men with more and less hair, all of whom also stand out from the crowd). Of course, since not everybody has the same

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This view combines well with positions that defend the claim that vague concepts are the result of our epistemic limitations. (see, for example, Sorenson 1988, Williamson 1994).
reactions towards baldness, some cases will come under dispute (for example, one person says that John is bald, another disagrees thinking that 'bald' is a pejorative and that John remains quite attractive). We could adjudicate such disputes in a number of ways that are consistent with (OR) and bivalence. For example, one solution would be to reform our usage making it more precise. Hence 'bald' could be discarded in place of 'has fewer than n hairs'. This of course is the difficult path noted above (in practice this would render 'nobody knows' the best answer to many disagreements, though it would eliminate borderline cases), but I see nothing blocking it in principle. On the other hand, we could tolerate such disputes and attempt to single out John by means of some other distinguishing characteristic.

On the other hand, even if the world does contain vague states or objects (as metaphysically bizarre as they might be), this ought not to affect our commitment to (OR) or bivalence. Since our language allows us to form vague statements, we can assume that such statements are made true by vague states of affairs that either obtain or don't. Let us assume that rather than having a determinate height, John in fact has the vague property of being 'somewhat tall' or 'tall to degree 0.7'. Then it follows that 'John is somewhat tall' is true as is 'John is tall to degree 0.7'. The negations of these statements—'John is not somewhat tall' and 'John is not tall to degree 0.7'—are false in this case. So long as vague states of affairs obtain mind-independently, they give us no reason to analyze truth epistemically or to surrender bivalence.

8. The Liar Paradox
The liar paradox is certainly troubling, but a few points are in order. First, notice that if one takes epistemic accounts of truth to motivate multivalent logics, then one is still faced with 'strengthened' liar paradoxes, i.e. statements of the form 'this sentence is false, or neither true nor false' (see Kirkham 1992, ch. 9). If such a statement is true, then it is false or neither true nor false and hence not true; if it is false, then it is true; if it is neither
true nor false, then it is true. Since a trivalent statement is true, false or neither, the strengthened liar sentence is both true and not true (though not both true and false). These paradoxes arise no matter what the valence of the proposed logic and happen to scuttle solutions such as Kripke's truth value gaps approach (Kripke 1975). Therefore, rejecting bivalence won't help with the liar paradox.

Secondly, some ingenious, bivalent solutions to the liar paradox have been proposed, including the situational semantics of Barwise and Etchemendy (Barwise and Etchemendy 1987) and the revision theory of truth, developed independently by Gupta and Herzberger (Gupta 1982, Herzberger 1982). While no solution has garnered widespread support, we should remember that the tools of modern logic have only been brought to bear on this problem for less than a century and are themselves still developing. So we ought not to be unduly pessimistic about the possibility of solving the liar paradox without surrendering bivalence.

Finally, though the liar paradox presents the advocate of bivalence with a difficult logico-semantic problem, Misak's pragmatist is faced with the difficulty of making sense of subjunctive conditionals in an objective and systematic way (Putnam 1992 is skeptical of this possibility). If this latter problem is not reason enough to abandon pragmatism, then perhaps it would be premature to abandon classical logic on account of the liar paradox.

9. Non-Epistemic Truth and Accessibility

The uncertainties and obscurities that plague our attempts to understand the world need not be reflected in the ontological picture that we paint. Misak's examples, at any rate, do not give us any compelling reason to think otherwise. There remains the second issue to grapple with, namely the epistemic theorist's claim that only her account of truth renders it a notion of something cognitively accessible and useful. The challenge is that truth made non-epistemic is no truth at all.
The only plausible non-epistemic accounts of truth are the correspondence theory and the group of redundancy theories that I shall simply refer to as 'deflationism'. What these two sets share is a commitment to the idea that a statement is true or false in virtue of some external world condition that either obtains or fails to obtain. On the deflationist view, all that is required for the truth of 'snow is white' is that snow be white. For the correspondence theorist what is required in addition to this is that the statement and the condition be congruent or correlated in some way (the extension to falsehoods is apparent). I will be concerned only with what they have in common. For short, I shall refer to these non-epistemic views of truth as 'metaphysical'.

The epistemic theorist claims that any metaphysical theory of truth renders truth cognitively inaccessible. One of the most common manners in which this complaint is spelled out is along the lines of Putnam who claims that any concept of truth that is not tied to our epistemic capacities is one that demands a 'God's eye view' of reality, i.e. one that attempts to spell out truth in terms of correspondence with inaccessible noumena (to use Kantian terminology), or comparison of our beliefs with unconceptualized reality, thus making truth something that is impossible to come by and of no possible use to us (Putnam 1981).  

A number of points are in order here. First, echoing Kirkham (1990, pp. 101-4), I believe the value and nature of truth to be separate issues. We ought first to determine what truth is and then decide whether this is something that is of any importance to us. So, if it turns out that truth is a barren and useless concept, then let us abandon it and work with something else. That would be no more costly, as far as I can tell, than

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1 Notable examples include Quine's disquotationalism (Quine 1970) and Horwich's minimalism (Horwich 1990).
2 Of course deflationary conceptions of truth are put forth in the attempt to avoid metaphysics, to 'bring truth down to Earth', but I do not imply any particular metaphysical assumptions on behalf of the deflationist. I use 'metaphysical' merely as a somewhat elegant replacement for 'non-epistemic'.
3 Putnam focuses on the correspondence theory of truth which he believes to be central to the view he opposes, 'metaphysical realism' (see Putnam 1978, pp. 18-33).
committing to the highly implausible suggestion that the world itself must conform to our epistemic limitations.

Secondly, metaphysical theories of truth demand a 'God's eye view' of the world only if it is assumed that the mind-independent world is inaccessible to our minds and hence cannot be referred to accurately. If one argues, as for example Kant (1965) did, that the only world available to us is one that is itself conditioned by our minds, then one is surely going to reject any concept of truth that insists that we are able to speak truthfully about a mind-independent world (Putnam draws on Kant in support of his view). Nevertheless, if, as (OR) says, the world that we perceive is itself quite independent of our minds, then what the metaphysical conception of truth says is quite intelligible. One can sensibly combine the existence of a mind-independent world with the claim that it is the world that renders beliefs true or false (see Brown 1994, pp. 38-9, 78-81).

This of course leaves important questions to be answered. For example: what is it to refer to something?; what is the nature of justification, i.e. how do we know when a belief is likely to be true?; how are truth and justification related to perception?; and so on. However, the key question for present purposes is answered. What the metaphysical conception of truth asserts is not absurd. Furthermore, many philosophers who are sympathetic to non-epistemic accounts of truth have done important work in some of these areas (a notable example is Armstrong's theory of perception as found in his 1968). However, these issues are separate questions from those of what truth and reality are, and one need not conflate the two sets of issues unless one has a strong argument for the Kantian view of reality. Now, there certainly are arguments for this sort of view of reality, and arguments against. But if the epistemic theorist constrains truth the way she does on account of a particular ontological stance, then her arguments ought to be ontological rather than epistemic; and this, of course, is precisely the course I am defending: settle ontological questions first, epistemic questions second (see also Devitt
1997). This is why ontological considerations limit one's truth-theoretic options but not vice versa."

10. Truth, Ontology and Explanation

I suspect that those who defend an epistemic account of truth are interested in truth by way of epistemology, via the consideration of issues such as how we know, the nature of evidence, when to commit to beliefs, etc. Since to believe that $p$ is to believe that $p$ is true, and to be justified in believing that $p$ is to be justified in thinking $p$ to be true, and since evidence for $p$ is evidence that $p$ is true, it is commonly assumed that the elucidation of the nature of truth must be epistemically constrained. However, I don't believe that this is correct; truth has little or no role in epistemology.

Even though our beliefs, evidence gathering, and attempts at justification are all 'shots at the truth', it does not follow that the concepts available for the analysis of truth must come solely and exhaustively from the analyses of these epistemic notions. Nor, indeed, does it follow that the analysis of truth must be logically related to such epistemic notions. Everyone can agree that truth is what our beliefs aim at, that evidence suggests truth and that justification tracks truth. But one need not conclude from this that certain perhaps central features of belief, evidence and justification must be reflected in the conceptual elucidation of truth. If truth is the target, then there may be many things about our weapons, aiming techniques and rate of success that are not reflected there.

For the metaphysical theorist truth is not an evidential issue. Truth, in other words, is not what we use in forming beliefs or justifying assertions. In guiding our actions and beliefs we use those things that are epistemic (coherence, perception,

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1One may notice the absence here of any discussion of the so-called mind-world gap. I make no mention of it above because I don't believe there is such a gap. First, the mind (i.e. the brain) is itself in the world. Secondly, the mind is in constant causal contact with the world. Therefore, I don't see why our perceptual faculties couldn't render the external world transparent to us; our brains have surely evolved to process causal impingements into relatively accurate information about the world. Therefore, they generally enter true (accurate) belief states upon activation of our senses.

2This is Goldstick's phrase (see Goldstick, 1992, where this teleological aspect of truth is discussed).
testimony, etc.) precisely because they are accessible in principle. Nevertheless, such things are evidence of mind-independent conditions. Obviously, concepts such as justification, evidence and belief are subject to the limitations of human knowers. However, these notions need to be distinguished from the goal of belief-formation.

Misak protests\(^7\) that so long as there is a possible gap between epistemic virtue and truth, so long as a belief could be false despite exhibiting all the epistemic desiderata a belief could have (something that the metaphysical theorist believes is possible), then it does not make good sense to say that evidence suggests truth. But this conclusion is too hastily drawn from the metaphysical theorist's commitment to a certain class of modal statements. The reason that one countenances the possibility of false yet even ideally justified beliefs is that one agrees that our epistemic capacities might be limited and imperfect (they need not be, but even if they aren't, this is consistent with it being possible that they are). However, within those limits, our epistemic abilities are, it is supposed, quite nicely designed (or, rather, have nicely evolved) to accurately track truth. In other words, it makes sense to say that evidence suggests truth because it makes sense to say that the mind-independent world leaves traces of its states, traces that we have evolved to process into information about that world, even if one admits that not all aspects of the world must be such as to leave traces that we can make use of in this way.

Indeed, I am tempted here to turn the tables on the epistemic theorist and question her ability to make sense of the claim that evidence suggests truth if the latter notion is itself analyzed in epistemic terms. Consider some evidence, \(E\), in favour of a theory, \(T\); \(E\) might be, for example, an experimentally verified prediction of \(T\). We assume, with the epistemic theorist, that \(E\) is evidence for \(T\)'s truth. But what is it for \(T\) to be true? It is for it to exhibit some epistemic virtue such as being agreed upon when inquiry has been pushed as far as is fruitful. However, inquiry is, I presume, inquiry into the truth of a

\(^7\)Personal communication.
theory or proposition. For the pragmatist this means inquiry into the final standing (vis-à-vis agreement) of a theory or proposition. The upshot of this is that current evidence for $T$ is, according to (ET), evidence that there will be evidence for $T$ at the end of inquiry. After all, we assume that those who push inquiry as far as it will go will come to an agreement based on the evidence that their inquiry turns up. But, then, what do the final inquirers take their evidence to be evidence of? Presumably, it is evidence for the existence of evidence at the end of inquiry. Therefore, $E$ is evidence that there will be evidence that there will be evidence, and so on infinitely, for agreement concerning $T$. Whether or not one is willing to countenance the regress, the analysis is circular for in specifying the target of evidence (or warrant, justification, etc.), namely truth, one has relied on the notion of evidence (or warrant, justification, etc.) which therefore never gets explained.

Others (see Kirkham 1992, Alston 1996) have drawn attention to the general difficulty faced in elucidating warrant, evidence, justification, etc. as conduciveness to truth, where the latter is specified in epistemic terms. The problem is not peculiar to pragmatism but will affect any theory of truth cast in epistemic terms. The metaphysical theorist fares much better on this score.

In order to defend the connection between truth and warrant, the metaphysical theorist can point to her commitment to Tarski's T-schema,

$$(T) \ 'P' \ is \ true \ iff \ P$$

which is, if not entailed by the very meaning of 'true' (as argued in Alston 1996), at least universally accepted as a required consequence of any theory of truth. Thanks to the disquotational features of (T), a true belief logically commits one to the existence of the truth-maker for that belief. So to have warrant for (the truth of) a proposition is to make an ontological commitment. This explains how it is that epistemic virtues relate us to the mind-independent world, a world that is nevertheless not constrained by our epistemic
capacities. Combine this with (OR) and the metaphysical utility of truth becomes apparent. What's more, the practical utility of true beliefs can be seen to be due to the fact that a belief makes an ontological commitment to a truth condition and is true just in case that condition obtains. Given our need to navigate through this world, such beliefs are invaluable. There is no need to constrain truth epistemically in order to see this value.

It is consistent with what has been said so far in defense of metaphysical theories of truth to suggest that there would be no truths if there were no people. Since 'is true' applies to beliefs, statements, propositions, or what have you, there would, one might suppose, exist nothing to be true if there were no people. However, (T) plus (OR) entail that the absence of truths has no bearing on the world itself; the world would remain quite as it is even if there were no people (there would be as many potential truths about the world as there are actual truths, excluding truths about people and their beliefs and actions).

Misak, surprisingly, agrees with this. She quotes (Misak 1992, p. 372) Brian Ellis approvingly,

> a Peircean realist can, and indeed should, be a realist in the quite full-blooded sense of believing that there is a reality which exists independently of anyone's knowledge of it, or beliefs about it. For, on the best available theories that we have concerning the nature of the physical world, and our relationship to it, reality would be much the same, even if the human race had never existed (Ellis 1990, p. 270).

But to agree to this while defending an epistemic theory of truth is to agree that either there are facts that lack corresponding truths or else to deny the possibility of inaccessible facts. Or, one could deny the claim that to be true is to accurately describe the world, but that would be to deny (T). Finally, though Misak doesn't do this, I suppose one could deny the possibility of epistemic uncertainties such as underdetermination or vagueness,

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*Misak finds Ellis' commitment to current theories suspect, but she agrees with his overall stance concerning ontology.*
but this would be extremely difficult to defend. Though it is less optimistic about our epistemic abilities, (OR) plus metaphysical truth looks more and more like the better option. A dose of epistemic humility seems quite reasonable.

11. Ontological Realism and Explanation

There is good reason to believe in (OR). For one thing, as Ellis points out in the above quotation, our best investigations into the physical world, including the world of human beings and their perceptual faculties, strongly suggest that the world exists independently of our cognitive attitudes. Even if that world contains vague or indeterminate states of affairs, so long as they are conceived of being such independently of our beliefs, (OR) is safe. It is only the belief that such ontological states must align perfectly with epistemic indeterminacies (even if they will) that is being questioned here.

Furthermore, (OR) has the benefit of posing a relatively unified explanation of the conclusion so compellingly suggested by the sciences. If the world indeed exists independently and externally to us, then those scientific results are natural. Similarly, the tremendous effort it takes to understand the world in any detail, the difficulties with which it presents us, all become expected once we realize that our knowledge gathering skills and the world we seek to know are not assured of a perfect fit. It is necessary that we work to mould our epistemic capabilities to the world as best we can, something that is not necessarily easy. Let me suggest, moreover, that if we are able to push our explanations a little deeper than the level of the phenomena, if we can add an explanatory hypothesis to our predictively successful theories, then we ought to do so for in this way we maintain all the advantages of instrumentalist conceptions of ontology while improving upon their explanatory power. We shouldn't stop positing explanations until it becomes incoherent or impossible to do so. Given this outlook, (OR) has substantial metaphysical value.
Crispin Wright has recently argued that realism is the combination of two kinds of thought, one 'modest' the other 'presumptuous'. The modest thought is that the world exists independently of human beliefs; the presumptuous thought is the claim that not only are we humans capable of 'conceiving the world aright', we often know when we have succeeded in this remarkable achievement (Wright 1992, pp. 1-2). In a similar vein, Paul Horwich suggests that there are two components of realism, a claim concerning the 'metaphysical autonomy of the world' and a claim concerning its 'epistemological accessibility' (Horwich 1990, p. 59). In Horwich's opinion, the genuine and deep disagreement between the realist and anti-realist is a disagreement over the coherence of combining these two features. I hope to have shown that we can combine both kinds of claim by separating out the metaphysical and epistemic components or our theorizing about the world. We can adhere to an attractive realism, defend the accessibility of the world while avoiding the pitfalls of epistemic accounts of truth.

12. Conclusion

I have tried to saddle the epistemic theorist (represented above by the pragmatist) with an unhappy choice. She must either: (i) deny the seemingly obvious claim that to speak or believe truly is to get the world right (which would render it doubtful that her theory is a theory of truth after all); or (ii) open herself up to charges of skepticism by severing truths from facts (while also implausibly denying that each fact has a potential truth attached to it); or else (iii) make an implausible claim concerning the link between our epistemic limitations and ontology, a link that is established in a question-begging manner. Given all this, the most reasonable option is to adopt what I have called a 'metaphysical' view of truth and restrict epistemology to theorizing over warrant, perception and belief-formation.
Appendix: Realism, Bivalence and Quantum Mechanics

The state of a micro-system, such as an electron in motion, can be represented by a vector, $|\psi\rangle$, in a Hilbert space (a Hilbert space is a set of arbitrarily many orthogonal vectors). According to the Copenhagen interpretation of Quantum Mechanics (due primarily to Neils Bohr), when the electron is undisturbed (i.e. unmeasured), $|\psi\rangle$ is (in the general case) in a superposition of states. While $|\psi\rangle$ is in such a superposition, the electron has, for example, neither a determinate position nor a determinate momentum; when either a position or momentum measurement is made, $|\psi\rangle$ 'collapses' onto one or another of the defining orthogonal vectors, each corresponding to a determinate physical magnitude. In short, according to Copenhagen, observers somehow play a central role in determining a quantum system's properties; they are not discovering what was 'already there'. This was, in essence, an ontological interpretation of Heisenberg's uncertainty principle which says that only one of various 'complementary' physical magnitudes can be known with certainty at a given time.

Of course many realists were unsatisfied with this interpretation. The best known attack on the Copenhagen interpretation is to be found in Einstein, Podolsky and Rosen's (EPR) paper (1935). Einstein et al. argue that it is not the case that reality is indeterminate, but rather that quantum theory (as interpreted by Copenhagen) is an incomplete description of reality; its incompleteness explains why it appears as if the electron is indeterminate prior to measurement. Their argument begins with the following principles,

(i) **Completeness** - A physical theory is to be considered complete iff every aspect of reality is represented in the theory;

(ii) **Criterion of Reality** - If one can predict, with probability one, the value of a physical magnitude, without disturbing the system, then that value corresponds to something in reality;

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For philosophically sophisticated treatments of the physics discussed in this appendix, see Brown 1994, Maudlin 1994 or McCall 1996.
(iii) *Locality* - Measurements that are space-like separated (i.e. outside of each others' light cones), are causally independent, i.e. the results of one cannot affect those of another.

Now consider, say, an excited particle that decays, releasing a pair of photons traveling in opposite directions. The spin of the initial particle was zero, so the net spin of the photons must equal zero (conservation of spin). Therefore, if one of the pair of photons has spin up (+1), then the other must have spin down (-1), and vice versa. When the photons are produced they are represented in Quantum Mechanics by a single state vector (the 'singlet state') that Copenhagen interprets as a superposition of states: (a) +1 for the Left photon (L), -1 for the right photon (R); and (b) -1 L and +1 R. In other words, it is not determinate whether or not the left photon is in the spin up state and the right in the spin down state, or vice versa (after all, there is only one vector and it is indeterminate with respect to its spin assignments). Assume that we wait some time after the initial decay event, and measure one photon (say the left). We can, thanks to conservation of spin, immediately and with certainty infer the spin of the second photon without interacting with it in any way. Hence, even before measuring the right photon it is clear that its spin is an element of reality (by the criterion of reality above). Furthermore, the L-measurement can't have affected the R-photon since no causal signal can travel infinitely fast. Hence the spin of R exists determinately without the aid of human observation. Since, according to Quantum Mechanics (according to Copenhagen), micro-properties are indeterminate until measured, quantum theory is incomplete. The conclusion: the states of the photons were indeed determinate all along. In other words, there were what are known as 'local hidden variables' that rendered the state of the two photons determinate from the start.

Unfortunately, the realist conclusion of EPR has been experimentally contradicted. The problem is that if locality (no superluminal signals) is combined with realism (local hidden variables), then a formula, known as Bell's inequality, must hold,
but does not. To see this, consider an experimental set-up of the EPR thought experiment (Figure 5). S is a source that emits a pair of photons in opposite directions. The polarizors, P1 and P2, can direct the oncoming photon to either of two measurement devices, each of which is oriented at a certain angle with respect to the photon's direction of motion and can be set to detect spin up (+1) or spin down (-1). Detector A is parallel to the photons' direction of motion, the detectors labeled 'B' are angled at 30° (they can be treated as the same detector since they are inclined at the same angle), and detector C is at 60°.

Let us assume the existence of local hidden variables. Hence, each photon has a determinate spin from the source and we can represent its determinate state as the set of

\[{+1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +1, -1, +
values that would be measured by each detector the photon might encounter. For example, (+→) indicates that a photon will be measured spin up by detectors A and C, spin down by detector B. Since spin is conserved along a given axis of measurement, the hidden variable postulate must assign opposite spins to the photons for a given detector. For example (+→, -→) is allowed, but not (+++, +++). With three detectors and two spin values, there are eight possible hidden variable states,

1. (+++ , --
2. (+++, --)
3. (+++, --)
4. (+++, --)
5. (++, ++)
6. (++, ++)
7. (-→, ++)
8. (-→, ++)

A number of simple results can be derived from 1-8 above. For example, the probability, p, of measuring a result of (A+, B+) is equal to the proportion, pr, of photon pairs whose spin properties are given by 3 and 4 above. In other words,

\[ p(A+, B+) = pr(3) + pr(4). \]

Similarly,

\[ p(B+, C+) = pr(2) + pr(6) \]

and

\[ p(A+, C+) = pr(2) + pr(4). \]

But notice that,

\[ p(A+, B+) + p(B+, C+) = pr(3) + pr(4) + pr(2) + pr(6) \]

i.e.

\[ p(A+, B+) + p(B+, C+) = p(A+, C+) + pr(3) + pr(6). \]
But all the proportions are non-negative in magnitude, hence

\[(BELL) \quad p(A+, B+) + p(B+, C+) \geq p(A+, C+).\]

This is Bell's famous inequality and it follows quite simply from the assumption of local hidden variables, the finite speed of light and the well-confirmed conservation of spin.

However, Quantum Mechanics differs in its predictions for EPR-type setups. Without getting into the details, it is sufficient to note that the quantum mechanical probabilities are given by,

\[
\begin{align*}
p(A+, B+) &= \frac{\sin^2 30^\circ}{2} = \frac{1}{8} \\
p(B+, C+) &= \frac{\sin^2 30^\circ}{2} = \frac{1}{8} \\
p(A+, C+) &= \frac{\sin^2 60^\circ}{2} = \frac{3}{8}
\end{align*}
\]

an obvious violation of Bell's inequality. It turns out that the quantum mechanical predictions are borne out by experiment; Bell's inequality does not hold. Since the derivation of Bell's inequality rests only on the assumptions of realism and locality, one of the two must be false.\(^{17}\)

The anti-realist opts for the former, claiming that reality is indeterminate until measured (at least in the quantum realm), and Misak would presumably need to follow suit if the underdetermination claim (section 6) is to have any bite. However, the anti-realistic conclusions drawn from Quantum Mechanics remain extremely controversial. One could dispute these conclusions by supposing (as did the physicist David Bohm) that somehow the measurements at one end of the EPR set-up affect the far end (i.e. by giving up locality). This has become a respectable option ever since Bohm showed that this sort

\(^{17}\)One could obviously question the conservation of spin assumption, but this law has been confirmed in so many experimental set-ups, involving so many different types of particle, that scientists do not seriously entertain this option as the other two assumptions are more easily surrendered. After all, why should photons not obey conservation of spin here when they do so everywhere else?
of interaction could occur without creating any observable deviations from Einstein's Special Theory of Relativity. Alternatively, one could argue that the photons are determinately correlated all along, but that the cause of this correlation is not found in the singlet state (which is why Bell's theorem fails to hold). Rather, the measurements made at either end of the EPR set-up cause the photons to be correlated prior to measurement. Just as (at the macroscopic level) objects can have correlated properties after their interaction with measuring devices, at the quantum level (where, Price 1996 argues, backward causation is permitted) photons can have certain properties as the result of interactions in their future. The point is that it would be premature to conclude that modern physics comes down conclusively in favour of the anti-realist. A determinate ontology remains a respectable option.

Notice, furthermore, that even if photons and other micro-particles turn out to exist in superpositions of states it does not follow that one needs to give up on bivalence. The issue here is how to conceive of a superposition of states. Such a superposition means, for example, that a micro-particle, \( p \), is at some time, \( t \), in neither a spin up nor spin down state; it is in, let us say, a potential state that can become actualized as either spin up or spin down. But then, a suitably time-indexed statement about \( p \) will be either true or false. For example,

\[
\begin{align*}
(4) \quad & p \text{ has spin up (said at } t) \\
(4') \quad & p \text{ has spin up (said at } t' > t)
\end{align*}
\]

is false since I assume that to say that an entity has a property is to say that it has it determinately. On the other hand,

\[
\begin{align*}
(4') \quad & p \text{ has spin up (said at } t' > t)
\end{align*}
\]

*I am dismissing the suggestion that the particle is in a conjunction of spin up and spin down states for that replaces an indeterminate (with respect to spin) state with a determinate but contradictory one, which is (I am assuming) nonsensical.*
is determinately true or false (supposing that a measurement was made prior to \( t' \)). At least, the defender of (OR) who wishes truths to reflect the ontological state of affairs is well within her rights in defending bivalence as above.

On the other hand, if, at \( t \), one says,

\[
(5) \quad p \text{ potentially has spin up (down)}
\]

one says something that is true in either case, while if, at \( t \), one says,

\[
(5') \quad p \text{ is determinately spin up (down)}
\]

one says something that is false in either case. Since we have linguistic resources rich enough to describe potential vs. actual states, it follows that a statement positing a merely potential state is true or false depending on whether or not the world contains such a state; certainly the epistemic truth theorist has not yet convinced us otherwise. And whether or not a photon is in a determinate or potential state is a question whose answer is, at least so far as Quantum Mechanics is concerned, quite determinate.
Conclusion

Let me recap the structure of this essay. I begin with a two-point attack on the reality of tense. First, an examination of the most popular metaphysical conceptions of tense shows them to be of dubious coherence. Then, a look at Einstein's Special Theory of Relativity demonstrates that there are no physical grounds for the ontological division of the world along tense lines. The physical and metaphysical cases against tense provide support for each other. Any attempt to alter our logical or metaphysical views in order to accommodate ontological tenses lacks force in light of modern physics. Similarly, the effort to modify Special Relativity in order to make it compatible with ontological tense is unmotivated since tense is not a philosophically viable notion.

Having secured the need for a tenseless account of time, I turn my attention to rendering it credible, arguing that it is consistent with the semantics of tensed language, our ability to act freely and affect the future (but not the past), and our experience of time. Finally, I offer a metadefense of the project by justifying my reliance on ontological rather than epistemic considerations. Therefore, tenseless time is both forced upon us and available; it is the preferable stance on the nature of time.

It might be unsettling to some that so pervasive a feature of our mental life as tense turns out to be merely a feature of experience and not a reflection of the external world. I think that such a reaction would be unfounded. Concepts which, as Smart put it, 'contain a hidden anthropocentricity' (Smart 1963, p. 132) are regularly the casualties of our changing scientific-philosophical understanding of the world. And time is, after all, the concept that inspires the most fruitful and profound interaction between philosophy and science. It is not surprising, then, that its hidden anthropocentricities, though perhaps
better shrouded and therefore more entrenched than other concepts, should be revealed. Nonetheless, we should not despair over this result. It is, I believe, good for us to be pushed away from the (metaphorical and literal) center of the universe. Not only is this the correct understanding of our place in nature, but it is a view that can help to reduce human arrogance (one of the primary benefits of the scientific worldview). That, at any rate, is one objective in advocating a strongly non-anthropocentric view of the world. It is my hope, then, that the tenseless theory of time constitutes not only a small contribution to knowledge, but also a move towards our improvement as a moral species.
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