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TRUTH CONDITIONS OF TENSED SENTENCE TYPES*

ABSTRACT. Quentin Smith has argued that the new tenseless theory of time is faced with insurmountable problems and should be abandoned in favour of the tensed theory of time. Smith's main argument attacks the fundamental premise of the tenseless theory: that tenseless truth conditions for tokens of tensed sentences adequately capture the meaning of tensed sentences. His position is that tenseless truth conditions cannot explain the logical relations between tensed sentences, thus the tensed theory must be accepted. Against Smith, this paper adopts an alternative approach to the explanation of the entailment relations between sentences which contain indexicals. The approach drops the reliance upon tokens and instead relies on the evaluation of sentence types with respect to a context rather than upon actual or possible utterances of tokens of the types. This (new) version of the tenseless theory of time can adequately explain the relevant entailment relations between tensed sentences.

1. INTRODUCTION

Quentin Smith (1993, 1994a, 1994b, 1994c, 1994d, 1994e) has initiated a full frontal attack on the tenseless theory of time. The tenseless theory holds that events sustain unchanging relations of *earlier than*, *later than* and *simultaneous with*, and that tokens of tensed sentences have tenseless truth conditions which capture the meaning of the tensed sentences. Smith argues that the tenseless truth conditions of tokens of tensed sentences do not explain the logical relations between the tensed sentences, and thus are not able to adequately capture the meaning of tensed sentences. Proponents of the tensed theory of time use these arguments to claim that the tenseless theory is 'in retreat' (Craig 1996b, 249) or 'false' (Smith 1993, 12).

Against Smith, this paper will adopt an approach to the explanation of the entailment relations between sentences which contain indexicals that relies on the evaluation of sentence types with respect to a context rather than upon actual or possible utterances of tokens of the types. This will allow us to give a tenseless explanation of the entailment relations between sentences which contain indexicals and rebut Smith's arguments against the tenseless theory of time. The paper will focus on the debate on D.H. Mellor's (1981, 1988) token-reflexive account, as this debate characterises Smith's position against the tenseless theory of time, and the

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solution suggested by the paper can be generalised as a response to Smith's central arguments. The discussion in Sections 5 and 6 applies to sentences containing personal and spatial indexicals as well as temporal indexicals.

2. THE DEBATE ON THE NATURE OF TIME

The debate about the correct description of the nature of time centres primarily around two incompatible theories: the tensed theory and the tenseless theory. Those who hold the tensed theory of time (tensers) argue that events possess the tensed properties of *pastness*, *presentness* and *futurity*, and that a theory of time must incorporate tensed descriptions of event properties.[1] Those who espouse the tenseless theory (detensers) argue that the properties of *pastness*, *presentness* and *futurity* do not exist, and that events sustain unchanging relations of *earlier than*, *later than* and *simultaneous with*. Detensers argue that since reality is tenseless, a theory of time need only incorporate tenseless descriptions of events, so ontological descriptions including tensed event properties are incorrect or at best superfluous.

Although ordinary language and folk intuition are normally characterised in terms of tensed sentences, the original advocates of the tenseless theory of time (the old tenseless theory of time) held that all tensed sentences (and their tokens) could be translated by tenseless sentences. If tenseless sentences can translate tensed sentences, the need for a tensed theory of time is eliminated. Detensers held that their theory gave the correct metaphysical description of time and that the characterisations of tensed sentences given by tensers were incorrect.

However, as the result of developments in the philosophy of language in the area of demonstratives and indexicals, it soon became apparent that tenseless sentences could *not* translate all tensed sentences.[2] Tensed sentences containing the word 'now', such as 'It is now 1980', could not be translated into tenseless sentences, even when using phrases like 'simultaneously with this utterance', etc. As a result, detensers have developed new versions of the tenseless theory of time which they claim allow tenseless sentences to give the *meaning* of the tensed sentences. Detensers now admit that tensed sentences or their tokens are not translatable into tenseless sentences but argue that, nevertheless, tenseless characterisations of the truth conditions of tokens of tensed sentences can adequately capture the meaning of tensed sentences. For detensers, these considerations, in conjunction with McTaggart's (1908) argument that the application of tensed properties and the concept of temporal becoming to reality involves a contradiction, are sufficient for the elimination of tensed properties.

Smith, in *Language and Time* and *The New Theory of Time*, challenges the two main tenseless theories of time: the token-reflexive account and the date-analysis version. The modern token-reflexive account has been given by D. H. Mellor, one of the foremost proponents of the new tenseless theory of time.[3] Mellor's book *Real Time* (1981) sets forth his token-reflexive theory, which holds that untranslatable tensed sentences and their tokens can be characterised using tenseless token-reflexive truth conditions. The other main tenseless version, the date-analysis theory, holds that the truth conditions of tensed sentence-tokens characterise the temporal relations of the subject matters of the tokens to the dates on which the tokens occur. The date-analysis version has been put forward by J. J. C. Smart (1980) and Murray Macbeath (1983).

In his works, Smith argues that '. . . [T]he new tenseless theory of time is faced with insurmountable problems, and that it ought to be abandoned in favor of the tensed theory' (1994a, 40).[4] Smith bases a large part of his argument on two theses: (1) the token-reflexive theory advanced by Mellor is 'in contradiction with its own assumptions', and (2) the new tenseless theories in general are unable to explain the entailment relations between tensed sentences without relying upon his (new) version of the tensed theory of time. If Smith is correct, tenseless sentences cannot explain the logical relations between tensed sentences, and thus are not able to adequately capture the meaning of tensed sentences. If versions of the new tenseless theory of time must depend on the tensed theory of time in order to explain entailment relations between tensed sentences, they cannot claim that the tensed theory is false. Based on this, William Lane Craig claims

> The B-Theory of tense and time [the tenseless theory of time], though still widely held, is a theory in retreat. The [old tenseless theory of time], which held that tensed sentences can be translated without meaning loss into canonical tenseless sentences, whether by means of a date-sentence analysis (Frege, Russell) or a token-reflexive analysis (Reichenbach, Smart) is today recognised even by [detensers] to have been a failure. The [new tenseless theory of time], which attempts to escape the reality of tensed facts by means of a tenseless, token-reflexive analysis of the truth-conditions of tensed sentences (Mellor, Oaklander), turns out, upon reflection, to be inadequate and even incoherent (1996b, 249).

This paper will argue against the tensed theory of time adopted by Smith, and in the process attempt to clarify and refine the tenseless theory by developing an alternative account of the tenseless truth conditions of tensed sentences, one which has antecedents in the work of Richard Montague (1979a) on tense and indexicals. The version of the tenseless theory will be developed through an examination of why Mellor and his defenders are unable to respond successfully to Smith's criticisms of their token-reflexive theories. Smith's first thesis shall be rejected by showing that his interpretation of Mellor's theory is incorrect and contains

a logical fallacy, and that when the interpretation is refined so as to be logically acceptable the 'internal contradiction' disappears. Smith's second thesis shall be rejected on the grounds that tenseless accounts of indexical-containing sentences which depend upon truth conditions of *tokens* of tensed sentences, such as token-reflexive (and date-analysis) theories, are flawed. The criticisms directed against the tenseless theory of time may be met if we instead evaluate the truth of the tensed sentence *types* with respect to their contexts and construct tenseless truth conditions for these types, for we may then use these tenseless truth conditions to explain the entailment relations between tensed sentences.

3. MELLOR'S TOKEN-REFLEXIVE THEORY OF TIME

Smith's attack on the new tenseless theory of time begins with the claim that Mellor's new token-reflexive theory reduces, on pain of contradiction, to the old tenseless theory of time.[5] He has further arguments against the new tenseless theory, but in order to confront those arguments squarely, in this section we will dispose of the charge of internal inconsistency.[6] Since we are making an internal critique of the argument attributing inconsistency to Mellor, our discussion will employ Smith's and Mellor's terminology (viz. 'stating a fact', 'translate' and 'tenseless facts'), although the exact meaning of these terms is somewhat unclear.

Smith (1994a) focuses on Mellor's (1981) view that a tenseless explanation of tokens of tensed sentences suffices to eliminate the need for tensed descriptions even though tensed sentences are untranslatable by tenseless sentences. Mellor argues that the truth conditions of tensed sentences can be characterised tenselessly using the truth conditions of their tokens, and that this characterisation allows the tenseless theory to explain the meaning of tensed sentences without utilising tensed properties. Therefore, tensed properties need not be assumed in a theory of time.

Smith argues that

> . . . Mellor's theory is self-contradictory in a crucial respect. Mellor inconsistently holds all five of these positions: (i) tensed sentences have different truth conditions than tenseless sentences, and thus are untranslatable by them, (ii) tensed sentences have tenseless truth conditions, viz., tenseless facts, (iii) these tenseless facts are the only facts needed to make tensed sentences true, (iv) tensed sentences state the facts that are their truth conditions, and (v) tensed sentences state the same facts that are stated by the tenseless sentences which state the former sentences' truth conditions . . . I will show that (i) is incompatible with (v) (1994a, 41).[7]

He then argues that Mellor's theory contains several assumptions which entail what he calls the Principle of the Identity of Truth Conditions, or PITC.

> In order to show that points (i) and (v) are incompatible, certain more or less implicit assumptions that Mellor makes must be made fully explicit. [These assumptions are] (a) [F]acts correspond to true tokens of sentences, but not to false sentence-tokens . . . . (b) [T]ruth conditions, conditions that are necessary and sufficient to make sentences true, are facts . . . . (c) [I]f a sentence as tokened on some occasion states a fact F_1, then the sentence as tokened on that occasion is true *iff* F_1 and every fact implied by F_1 exists . . . Now assumptions (a), (b) and (c) entail the *principle of the identity of truth conditions* (as I choose to call it):
>
> PITC: If two tokens of the same sentence or two tokens of different sentences state the same fact, F_1, they have the same truth conditions, i.e., are true *iff* F_1 and every fact implied by F_1 exists (1994a, 43).

Smith then claims that points (i) and (v), taken together with the PITC, imply a contradiction. Consider tokens of the sentences

(1) It is now 1980 (call any token of this sentence 'S')

and

(2) S occurs in 1980 (call any token of this sentence 'U').

Tokens of both (1) and (2) state the same fact, but their truth conditions differ, and thus the PITC is violated. The fact that tokens of (1) and (2) both state is the fact that *S occurs in 1980*, which is also the truth condition of tokens of (1). However tokens of (2), which state the same fact as tokens of (1) and thus have the same truth condition (*S occurs in 1980*), have an additional truth condition (according to Smith's characterisation) that tokens of (1) do not have, that tokens of (2), if true, are true regardless of when they are tokened.[8] So, following Smith, tokens of (1) and (2) state the same fact, but their truth conditions differ, which violates the PITC. This is the reasoning Smith uses to claim that Mellor's theory contains an internal contradiction.

Smith then argues that in order for Mellor to resolve this contradiction he must revert to the old tenseless theory of time with all its attendant problems. But Smith makes an important oversight in his assessment of Mellor, for the PITC itself is logically inconsistent, and this inconsistency does not follow from anything peculiar to Mellor's theory. To see the inconsistency in the PITC, consider the possibility of two tokens of different sentences, both which state fact F_1, but also state different or incompatible facts F_2 and F_3, respectively. What if tokens of sentence A state F_1 and F_2,

while tokens of sentence B state F_1 and F_3? For example, sentence A could be 'It is now 1997, and Cicero is dead', while sentence B could be 'It is now 1997, and Virginia Woolf is dead'. Clearly, tokens of A and B do not have identical truth conditions, and so the PITC is not valid. Fortunately, the PITC is not the Principle that follows from Smith's characterisation of Mellor's theory. We may revise the PITC to read:

PITC (revised): If two tokens of the same sentence or two tokens of different sentences state *all and only the same facts*, $F_{1...n}$, they have the same truth conditions, i.e., are true *iff* $F_{1...n}$ exists.

This is the Principle that follows from Smith's (a), (b) and (c). According to the revised PITC, only when tokens of two sentences state all and only the same facts would they then have identical truth conditions. And this is exactly what we see with Smith's characterisation of Mellor's new theory of time: tokens of the tenseless sentence (2) state the same fact as tokens of (1), yet the truth conditions of the tokens differ. Tokens of (1) state the fact F_1, that *S occurs in 1980*. Tokens of (2) also state F_1. But we may say that tokens of (2) state an additional fact F_2 (following the spirit of Smith's presentation of Mellor's argument) because of their tenseless nature; they state the fact that tokens of (2), if true, are true regardless of when they are tokened. So, tokens of (1) and (2) would both state F_1, but would not both state F_2, and so their truth conditions would not be the same. But this conclusion does not violate the revised PITC! Hence, Mellor's new tenseless theory of time is not forced to reduce to the old theory of time, as it is not in contradiction with its own assumptions, and Smith is unable to use this argument to claim that there can be no such thing as a token-reflexive theory of time (1993, 71).

4. LOGICAL RELATIONS BETWEEN TENSED SENTENCES

After claiming that Mellor's theory is inconsistent, Smith goes on to argue that the logical relation between the tensed sentences

(1) It is now 1980 (as before, call tokens 'S')

and

(3) 1980 is present (any token of this sentence shall be called 'V')

cannot be explained by the tenseless theory of time, and that as a result both the new and the old tenseless theories are false. This paper will agree

with Smith that the new tenseless theory of time must be modified in order to respond to his argument, but it will be argued that this modification does *not* require acceptance of the tensed theory of time.

Smith's argument is based on the entailment of *It is now 1980* by *1980 is present* and vice versa. He argues that if two sentences are logically equivalent, it is necessary that the truth conditions of those sentences entail one another.[9] If the truth conditions of two sentences entail one another, then an explanation of the equivalence of the two sentences is achieved. (Alternatively, if one sentence entails another, then the truth condition of the first sentence must entail the truth condition of the second sentence in order to explain the entailment.) However, the token-reflexive truth conditions of tokens of 'It is now 1980' and '1980 is present' do not entail one another, because the token-reflexive truth condition of a token S of 'It is now 1980' is that *S occurs in 1980*, while the token-reflexive truth condition of a token V of '1980 is present' is that *V occurs in 1980*. The problem is that the tenseless truth condition *S occurs in 1980* does not entail the tenseless truth condition *V occurs in 1980*, since it is not necessary for V to be produced simply because S is produced. Therefore, Mellor's theory cannot explain the logical equivalence of 'It is now 1980' and '1980 is present'.

Smith argues that the only way to explain the logical equivalence is to introduce 'tensed facts'.[10]

> There must be . . . other facts statable by S and V that explain this entailment, namely *tensed facts*. The tensed fact statable by S is that *it is now 1980* and the tensed fact statable by V is *1980 is present*, and these two facts imply each other. Alternatively, one could argue that these two facts are really one and the same fact, and that (1) and [3] entail each other because the same tensed fact is statable by tokens of each (1994a, 45–6).

Smith's tensed facts allow the logical equivalence of 'It is now 1980' and '1980 is present' to be explained. For him, unless the tenseless truth conditions of tokens of 'It is now 1980' and '1980 is present' can be shown to entail one another, tensed facts are necessary for an adequate theory of time.

L. Nathan Oaklander disagrees. Oaklander (1994a) defends Mellor's theory, accepting the premise that truth conditions of sentences that are logically equivalent must entail one another.[11] In his defence of Mellor, Oaklander relies upon the discussion of the meaning of tensed sentence types and tokens in Mellor (1988), where Mellor claims to be following Kaplan's (1989) theory of demonstratives and indexicals and states that a meaning of a tensed sentence token is a semantic function from the time when the token occurs to its truth condition (Mellor, 1988, 81).[12] Oaklander suggests that if Mellor can rely on his interpretation of Kaplan's theory to evaluate the meaning of tensed sentences, he can employ these views to

fashion truth conditions of tokens of tensed sentences that will allow him to rebut Smith's arguments.

If we simply follow Kaplan in order to determine the truth conditions of tokens (produced in 1980) of 'It is now 1980' and '1980 is present', we see that they are indeed the same, namely, that *1980 is at 1980* [or *1980 (is) 1980*], and it would seem that Smith's argument is refuted. However, if Mellor simply follows Kaplan's theory in order to determine the truth conditions, he contradicts his own characterisation of the token-reflexive truth conditions for tokens of tensed sentences that he presents in (Mellor 1981) and again in (Mellor 1988).

To see this, recall that for Mellor, the tenseless truth conditions of tokens of tensed sentences give the meaning of the tensed sentences, and his definition of the truth conditions of tensed sentences and tokens, as characterised (1981, 1988), is a token-reflexive definition: '[A]ny token of a past tense sentence, to the effect that some event happened N years (days, or whatever) ago, will be true if its date is N years (days, or whatever) later than the date of that event . . . . They are what we may conveniently call the tenseless "truth conditions" of these tokens' (1981, 41). The truth conditions of future and present tense tokens are of the same form, *mutatis mutandis*. For Mellor, 'To get one definite and unchanging truth-value [a tenseless truth condition] for a thing token of a particular tensed sentence type, we must in general specify not only the token but also a particular B series instant within its lifetime' (1981, 36).

Thus, Mellor states: '[L]et R be any token of "Cambridge is here" and S be any token of "It is now 1980" . . . . Then R is true *iff* it occurs in Cambridge, and S is true *iff* it occurs in 1980' (1981, 74). He presents the same characterisation later (Mellor 1988), in his discussion of a token s(KN) of S(KN), where S(KN) is the sentence 'K faces food now': '[A token] s(KN) is true if and only if it occurs while K faces food, [since] S(KN) is temporally token-reflexive' (80).

The token-reflexive account of truth conditions for tokens of tensed sentences is the centrepiece of Mellor's contribution to the contemporary debate on time, and provides an account of how tensed sentences are indispensable for timely action and communication, yet dispensable in the account of the ontological nature of time. 'So, far from the tenseless view of time, with its token-reflexive analysis of tensed belief, implying that tensed beliefs are dispensable, it alone explains exactly why they are not' (1981, 88).[13] The truth conditions of tokens (produced in 1980) of 'It is now 1980' and '1980 is present' as defined under Kaplan's theory, that *1980 is at 1980*, are not token-reflexive truth conditions and so are

inconsistent with Mellor' token-reflexive account of the truth conditions for tokens of tensed sentences.[14]

In his defence of Mellor, perhaps realising that the truth conditions according to Kaplan are not token-reflexive, Oaklander does not argue that Mellor would accept *1980 is at 1980* as the truth conditions for tokens of 'It is now 1980' and '1980 is present'.[15] Instead he argues that the truth conditions should be revised from *S occurs in 1980* and *V occurs in 1980* to (4) and (5):

(4) Any token *S* of (1) is true with respect to the context in which it is produced *iff* the year of its context is 1980,

and

(5) Any token V of [3] is true with respect to the context in which it is produced *iff* the year of its context is 1980.

Oaklander argues that the tenseless truth conditions of tokens of 'It is now 1980' and '1980 is present' are identical, because they depend on the same context for their truth, and so the token-reflexive theory can meet Smith's challenge (1994a, 63).

However, although at first glance it seems as though the truth conditions of tokens of 'It is now 1980' and '1980 is present' are identical (i.e., the token is true *iff* the year of its context is 1980), when we recognise that in (4) the pronoun 'its' refers to the token S, and in (5) the pronoun 'its' refers to the token V, it is revealed that the truth conditions are not the same. Smith makes exactly this point in (1994b), where he shows that Oaklander can only make the truth conditions (4) and (5) appear to be the same by equivocating upon 'it':

'But once we replace the occurrences of "it" by names of the relevant tokens, this appearance of similar truth conditions vanishes. The tenseless truth conditions [of tokens S of 'It is now 1980' and tokens V of '1980 is present'] are these:

(6) Any token S of (1) is true with respect to the context of S's utterance [production] *iff* the year of S's context of utterance [production] is 1980.

(7) Any token V of [3] is true with respect to the context of V's utterance [production] *iff* the year of V's context of utterance [production] is 1980' (1994b, 73).

Since the sentences 'It is now 1980' and '1980 is present' are logically equivalent, but the token-reflexive truth conditions of their tokens do not entail one another, Smith argues that Mellor's token-reflexive account must be rejected and that tensed facts are required in order to explain the entailment relation.

Smith then claims that we must return to the original issue he put forth regarding how the tenseless theory of time is to explain the logical entailment. As it stands, Smith is able to argue effectively against the token-reflexive account, for it seems to be the case that Mellor and others claim to be able to capture the meaning of ordinary tensed sentences, and that the token-reflexive truth conditions of tokens of 'It is now 1980' and '1980 is present' do not entail each other when we rely on the usual rules for entailment relations between the truth conditions of logically equivalent sentences (namely, that when *P iff Q* and *R iff S*, then if *P iff R*, then *Q iff S*).[16] Since, as Oaklander notes, '. . . . [I]f one sentence logically implies a second, then we should be able to justify the inference on the basis of truth conditions' (1994a, 62), must we accept that we cannot demonstrate that tensed properties are reducible to tenseless relations, and admit the tensed theory of time in order to explain the logical relation?

5. TRUTH CONDITIONS AND ENTAILMENT RELATIONS

Although mutual entailment of the tenseless truth conditions of tokens of tensed sentences seems to be a *sufficient* condition for the explanation of a logical equivalence between tensed sentences, it is not clear that this condition is *necessary*. Smith's argument that we require the tensed theory of time in order to explain the entailment relation survives only on the basis of his assumption that it is a necessary condition for a tenseless explanation of the entailment between two tensed sentences that the truth conditions of their tokens entail each other.

In this section, a different and more direct approach will be adopted towards the explanation of entailment relations between tensed sentences. The emphasis upon tokens will be dropped. To explain the equivalence of 'It is now 1980' and '1980 is present', I will argue that sentences which contain indexicals are unusual because their truth depends upon the context in which they are produced.[17] Thus, an explanation of the entailment relations between sentences which contain indexicals may not follow the same rules as those for sentences which do not. Since the truth of a sentence which contains indexicals varies according to the context at which it is evaluated, it must be evaluated with respect to its context (I will call this the 'context of evaluation') in order to determine its truth value. By 'context of evaluation' I mean an index that includes a possible world, a time, a place, and an agent (and anything else that is necessary to give the sentence a truth value). Truth of tokens is not lost on this analysis: a token is true in a context just on condition that its type is true with respect to its context.

Accordingly, we may modify the standard (i.e., non-indexical) notion of implication, where A logically implies *B iff* when A is true, B must also be true, to give us a general characterisation of implication with respect to sentences which contain indexicals:

> For sentences (which contain indexicals) A and B, A logically implies B 'iff for any context of evaluation C, where A is true with respect to C, B is true with respect to C.

We may then define sentences (which contain indexicals) A and B as logically equivalent if and only if they logically imply each other.

These definitions may be used in conjunction with the truth conditions of sentence types that contain indexicals in order to explain entailment relations. Note that I have dropped the requirement that the truth conditions of logically equivalent sentences (that contain indexicals) must be logically equivalent; logical equivalence of truth conditions is sufficient but not necessary for the explanation of entailment relations.[18]

In addition, we must recognise that it should be possible to evaluate whether or not a type is true with respect to a context without requiring that tokens of the type be produced in that context. This condition for analysis is warranted in order for us to correctly interpret standard types of sentences which contain indexicals. For example, the sentence type 'No tokens are being produced now' should not be necessarily false, yet if we require that tokens be produced in a context in order for the type to be evaluated with respect to that context, then in every evaluable context 'No tokens are being produced now' is necessarily false.[19] Thus, the evaluation of sentences with respect to a context should not require that tokens of those types be produced in that context. In other words, tokens of A need not occur in the context of evaluation C in order for the truth of A to be evaluated with respect to C.[20]

Accordingly, we may examine a sentence type with respect to a context of evaluation in order to shed some light on Smith's problem. The definition allows us to explain the logical equivalence of (1) 'It is now 1980' and (3) '1980 is present', since we know that '*It is now 1980' is true iff the time of its context of evaluation is 1980*, and we also know that '*1980 is present' is true iff the time of its context of evaluation is 1980*. Therefore, for the context of evaluation C, when 'It is now 1980' is true with respect to C, '1980 is present' is true with respect to C, and when '1980 is present' is true with respect to C, 'It is now 1980' is true with respect to C. This, by our definition, means that 'It is now 1980' and '1980 is present' are logically equivalent.

Let's examine how tensed sentences that are not logically equivalent fare using the argument above. Take the two tensed sentences

(8) It is now 1997

and

(9) 1996 is past.

Intuitively, (8) entails (9), but (9) does not entail (8). How could we explain this entailment using tenseless token-reflexive truth conditions? It cannot be argued that the token-reflexive truth condition for tokens of (8), that *Any token of 'It is now 1997' is true iff it is produced in 1997* entails the token-reflexive truth condition for tokens of (9), that *Any token of '1996 is past' is true iff it is produced later than 1996*, for the production of a token of 'It is now 1997' does not entail the production of a token of '1996 is past'. We must instead recognise that the truth conditions of the types are that '*It is now 1997' is true iff the time of its context of evaluation is 1997*, and that '*1996 is past' is true iff the time of its context of evaluation is later than 1996*. The truth conditions taken together with our definition of entailment explain the entailment relation, since a context with a time of 1997 is by definition a context with a time that is later than 1996, and so when 'It is now 1997' is true, '1996 is past' must also be true.

Similarly, we may explain why

(10) Princeton is here

entails

(11) Princeton is at this location,

although the production of tokens of (10) do not entail the production of tokens of (11). We need only examine the truth condition of (10), that '*Princeton is here' is true iff the place of its context of evaluation is Princeton*, in conjunction with the truth condition of (11), that '*Princeton is at this location' is true iff the place of its context of evaluation is Princeton*.[21] We may then recognise that (10) and (11) fit our definition of logical equivalence for sentences which contain indexicals.

Using the truth conditions of sentence types with respect to a context of evaluation seems reasonable, for it is because we recognise that sentences containing indexicals like 'It is now 1980' and '1980 is present' are true with respect to all and only the same contexts that we want to say they are logically equivalent. Smith's argument is based on the premise that

the production of tokens of one sentence type do not entail the production of tokens of another type (or even of the same type). He then argues that therefore detensers must admit 'tensed facts' in order to explain the equivalence. But we need not accept this conclusion. We do not need the tensed theory of time to explain entailment relations between tensed sentences, rather, we need to recognise that an account of the meaning of sentences containing indexicals that relies upon token-reflexive truth conditions is inadequate to explain the logical relations between those sentences.

We can see this when we recognise that if a tensed theorist were to maintain that token-reflexive truth conditions are necessary to give the meaning of tensed sentences, then Smith's criticism of the tenseless theory could be applied, *mutatis mutandis*, to the tensed theory. Refer back to sentences (8) and (9):

(8) It is now 1997

and

(9) 1996 is past.

The production of any token of (8) does not entail the production of any token of (9). If we were to admit the existence of tensed properties, the tensed token-reflexive truth condition for tokens of (8) would be *Any token of 'It is now 1997' is true iff it is produced when 1997 is present*, and the tensed token-reflexive truth condition for tokens of (9) would be *Any token of '1996 is past' is true iff it is produced when 1996 is past.* However, it is still the case that the tokening of (8) does not entail the tokening of (9), and thus the equivalence is not explained.

We can now see that the problem of explaining the logical equivalence of 'It is now 1980' and '1980 is present' does not stem from refusing to admit the existence of the tensed theory of time, but rather with the use of token-reflexive truth conditions for tokens of tensed sentences. Detensers may need to drop their reliance on tokens and token-reflexive truth conditions, but they need not embrace the tensed theory.

6. CONCLUSION

Evaluation of types with respect to contexts of evaluation is sufficient for detensers to explain the sorts of logical relations that hold between tensed sentences and so defend the tenseless theory against criticisms such

as Smith's. Therefore, we may use tenseless truth conditions to explain the equivalence of 'It is now 1980' and '1980 is present', regardless of the (rather artificial) logical dilemma where one sentence entails another sentence but the occurrence of a first token does not entail the occurrence of a second token. If we may use tenseless truth conditions to explain entailment relations between tensed sentences, we may support the main tenet of the new tenseless theory of time: that tenseless truth conditions give the meaning of tensed sentences. If the solution is not accepted, a dilemma such as Smith's can arise.

If the analysis based on types is sound it may be seen as an alternative to extant tenseless accounts, one which does not fall prey to the arguments put forth in Smith's (1993, 1994a, 1994b, 1994e). To date, the main proponents of the tenseless theory of time have focused on the tenseless truth conditions of the tokens of tensed sentences. The lesson for detensers is that the emphasis upon tokens should be replaced with an emphasis upon types. If we rely upon our definition for entailment along with the truth conditions for sentence types rather than the truth conditions for tokens, we may explain the logical relations between tensed sentences using tenseless truth conditions and eliminate the need for an explanation relying upon the tensed theory of time.

Although the possibilities are not fully explored here, the discussion is relevant to wider debates about the meaning of sentences which contain indexicals. If we wish to explain our dependence upon sentences such as 'Princeton is here' without admitting the existence of a spatially variable property of 'hereness' we may evaluate sentence types with spatial indexicals with respect to their context of evaluation; likewise for indexicals relative to agents and worlds.[22] We may thus use the arguments in this paper in order to explain general entailment relations between sentences which contain indexicals that characterise beliefs about time, location, agents and worlds, without implicitly relying upon suspect metaphysical notions involving variable temporal, personal or spatial properties.

NOTES

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[1] I am here focusing on the main versions of the contemporary tensed theory. Not all tensers, e.g., Prior (1968), Christensen (1976), and Lloyd (1978), believe there are tensed properties.

[2] Cf. Davidson (1971), and Kaplan (1989), pp. 489–507, esp. pp. 498–500. Also see Smith (1993, 3–93), and Smith (1994a, 38–40) for discussions on this issue.

[3] Reichenbach (1947), Smart (1966), and Searle (1983) have each defended some version of the token-reflexive theory as well. See Smith (1993, 67–72) for a discussion of their work.
[4] Cf. also Smith (1993, 3–93).
[5] Smith (1994a). Also see Smith (1993, 69–70).
[6] The charge should be cleared in any case: others have accepted the claim (see Oaklander, 1994a, 1994b and Craig, 1996a) or levelled a similar claim (Sanford, 1984, 290–1). The 'further arguments' against both versions of the new tenseless theory (token-reflexive and date-analysis) alluded to in the text are found in Smith (1993, 1994a, 1994b, 1994c, 1994e) and are discussed in Section 4 of this article.
[7] Mellor (1992) claims that he prefers to avoid some of the terminology that Smith uses (viz. 'stating' facts), although Smith claims to be presenting Mellor's view and for the most part relies on Mellor's terminology as presented in Mellor (1981). As stated in the text, since this section of the article is an internal critique, Smith's (and Mellor's) terminology will be used in the discussion where it is relevant to do so. Use of Smith's and Mellor's terminology should not lead the reader to assume that the author accepts this terminology or the semantics it may imply (i.e., the definition of 'fact' or the relations between facts and truth conditions). As the debate between Smith and Mellor seems to be defined by some unexplained notions, it may be the case that many of the problems would dissolve if the terminology was explicated clearly and precisely. This, however, is a topic for another paper.
[8] Smith describes the relevant truth condition of tokens of (2) as tokens of (2) are true 'at all times' they are tokened:

> . . . [A]ny token [U] of 'S occurs in 1980' has different truth conditions than any token S of 'It is now 1980', for S is true iff it occurs in 1980 and "S occurs in 1980" if true at all is true 'at all times' it is tokened (Smith 1994a, 44).

The meaning of the sentence '*S occurs in 1980' is true 'at all times' it is tokened* seems to be that the tokens [of (2)], if true, are true regardless of when they occur.
[9] Smith rejects Mellor's (stronger) requirement that the truth conditions of the tokens of two sentences which translate one another must be identical (Smith 1994a, 55).
[10] In his positive arguments in favour of the tensed theory of time, Smith (1994a; 1994b) again uses the expression 'stating facts' and follows Mellor in the use of the term 'fact':

> . . . I shall also assume facts and shall use the term 'fact' in the way that Mellor does . . . the first being that (a) facts correspond to true tokens of sentences, but not to false sentence-tokens. Accordingly, if we talk of a sentence 'stating a fact' . . . this sentence is to be understood as elliptical for some phrase like 'stating what is taken to be a fact by the sentence-user'. . . . [The second is that] (b) truth conditions, conditions that are necessary and sufficient to make sentences true, are facts. A third assumption that is implicit in Mellor's theory follows . . . that (c) if a sentence as tokened on some occasion states a fact F_1, then the sentence as tokened on that occasion is true *iff* F_1 and every fact implied by F_1 exists (Smith 1994a, 42–3).

Smith holds that 'sameness of facts explicitly stated or statable is a necessary condition of translation, where "sameness" means logical equivalence' (Smith 1994a, 55).
[11] In a different response, Oaklander accepts Smith's assumption that a logical entailment between tensed sentences must be explained by a logical entailment between those sentences' truth conditions. This leads him to agree with Smith that ' . . . . [T]enseless truth conditions cannot explain the logical equivalence of (1) and [3]' (1994b, 78). Oaklander

then argues that although the new tenseless theory cannot explain the logical entailment between Smith's tensed sentences the problem is irrelevant. The new tenseless theory can reject the method of analysis that Smith uses since it no longer depends on translation of tensed sentences for its justification.

For Oaklander, since the new tenseless theory of time argues that ordinary language cannot adequately explain the nature of time, it need not explain logical relations between sentences in ordinary language. The new tenseless theory of time is concerned with capturing the metaphysical nature of time with an 'ontologically adequate language' rather than the semantics of ordinary language. So the new tenseless theory does not have to explain Smith's entailment, and tensed facts need not be introduced into a theory of time.

Smith (1994c) responds that Mellor (1981), Smart (1966), MacBeath (1983) and others claim to be able to explain the meaning of ordinary language using tenseless language. Smith points out that although Oaklander may reject the need for the tenseless theory to explain tensed language, his (Smith's) article is critiquing the position held by many detensers (Mellor, Smart, MacBeath) that tenseless truth conditions can explain away any need for tensed facts. Smith provides quotes from Mellor and Smart in order to prove his point and argues that

> Mellor explicitly and repeatedly says that his representation of the truth conditions of ordinary *A*-sentences and their tokens captures the semantic content or meaning of these tokens . . . . For Mellor tensed sentences 'may not have the same meaning as the tenseless sentences that give their truth conditions, but those truth conditions surely give their meaning' (1994c, 84–5).

In essence, Oaklander puts forth his own (interesting) theory, that the new tenseless theory need not explain ordinary language. Since most detensers – especially the proponents of the 'new theory of time' – do not support this premise, another argument must be found in order for them to deny Smith's conclusions.

[12] For Kaplan's semantics of indexical expressions, see Kaplan (1988, 1989).

[13] Mellor is quite clear about the importance of token-reflexive truth conditions to his account: 'The fact that [actions need tensed beliefs), however, and especially the token-reflexive reason for the fact, is both the crux of my case and the reason for the persistent and fatal attraction of the idea that tenses are real . . . action will be timely if it satisfies the token-reflexive truth conditions of the tensed belief it depends on' (1981, 82–83).

Mellor's token-reflexive account of tensed sentences provided detensers with an account of how tensed beliefs can be so important in daily existence yet dispensable in favor of a tenseless account. '. . . [W]e need to derive [tensed] beliefs with the right token-reflexive truth conditions to make us act in time . . . . We have seen that using tensed sentences demands nothing more than knowledge of when they are true and when false, i.e., of their token-reflexive truth conditions' (1981, 86–87). Mellor accounts for the indispensability of tense by arguing that tensed beliefs are real psychological properties with tenseless token-reflexive truth conditions. Thus, tensed facts are not necessary to explain the existence of tensed beliefs.

[14] A detenser might wish to respond by rejecting Mellor and adopting the date-analysis theory, which also makes use of Kaplan's theory. The date-analysis detenser could try to reconfigure the truth conditions of tokens of (1) and (3) by revising them so that the truth conditions would read:

(1^*) When *S* is produced in 1980, *S* is true *iff* 1980 is at 1980, and

(3^*) When *V* is produced in 1980, *V* is true *iff* 1980 is at 1980.

However, Smith (1994a, 1994b, 1994c) has a host of arguments against the date-analysis characterisation of the truth conditions – such as the argument that part of the truth condition in the date-analysis version is the clause that precedes the biconditional, which implies that the relevant parts of (1^*) and (3^*) are still different and do not entail one another.

Further, it is not clear that Kaplan's views can be used to support the tenets of the tenseless theory of time. Recent work in the philosophy of time suggests the possibility that a commitment to Kaplan's (1989) and Perry's (1977) theories of indexicals involves a commitment to the existence of temporally variable properties. Smith (1993, 1994e) argues that Kaplan's and Perry's theories of indexicals cannot be used to explain the entailment relations between the sentences 'The meeting is starting' and 'The meeting starts now' without allowing that indexicals such as 'now' directly refer *and* express senses that 'characterize . . . moments as past or present or future to some degree' (1994e, 150).

Tenser arguments against the detensers' use of the Kaplan (1988, 1989) and Perry (1977, 1979) accounts to supplement tenseless accounts of tensed sentences are further buttressed with questions Smith and Craig [following Wettstein (1986)] have raised regarding the explanation of the cognitive significance of tense and indexicals. The questions put forward by Smith involve worries about the cognitive significance of tensed beliefs expressed using the word 'now' (Smith 1994e, 145). Smith (1993, 45–8) also argues that detensers who rely on the views of Kaplan and Salmon (1986) cannot account for the need for cognitive significances to be logically equivalent (when they are of simultaneous productions of tokens of synonymous tensed sentences in exactly the same circumstances), without admitting the existence of tensed properties. Craig argues that the detensers' reliance upon the Kaplan-Perry analysis of cognitive significance is '[i]n truth . . . little more than the thinly worn token-reflexive analysis of the Old B-Theory [old tenseless theory] and suffers from the same deficiencies', and that tensed properties are required in order to explain the cognitive significance of tensed beliefs (1996b, 256–7). Craig (1996b, 257–8) also presents textual material that suggests that Kaplan (1989) and Perry (1988) make or allow the implicit use of tensed properties. Kaplan and Perry themselves have not explicitly discussed their views on tensed properties.

There may be some detensers who would be inclined to elaborate or modify the Kaplan and Perry accounts in an effort to rebut the tenser arguments. However, the development of such an account is beyond the scope of this paper, and since my solution (see Section 5 of this paper) develops an alternative version of the tenseless theory of time, it may not be necessary.

[15] It is unclear to me whether Mellor and Oaklander correctly represent Kaplan's semantics. In any case, I interpret Oaklander as following the spirit, if not the letter, of Kaplan's account.

[16] There may be an alternative way to defend Mellor (for which I am indebted to David Lewis): replace the pronoun 'it' with a quantified variable, making the property shared by tokens S and V (and many others besides) the property P such that necessarily, for all x, x has P *iff* x is a token such that the year of x's context is 1980. We may then say that it is the sharing of P which explains the entailment of the truth conditions of 'It is now 1980' and '1980 is present'. This line of defence may solve Mellor's problem. However, as I am skeptical of the viability of token-reflexive theories in general due to their inability to account for the meaning (truth conditions) of tensed sentences which are true only if not tokened, I myself cannot accept Mellor's theory.

[17] Note that the problems with the token-reflexive account, as with the date-analysis account, seem to stem from the reliance on truth conditions for *tokens* of tensed sentences. The alternative (evaluating types with respect to contexts) that is suggested here rejects the

extant versions (token-reflexive and date-analysis) of the tenseless theory and in this sense can be seen as a general response to Smith (1993, 1994a, 1994b, 1994e).

[18] Of course the same holds, *mutatis mutandis*, for the explanation of one way entailment between sentences using truth conditions.

[19] This is a problem for Mellor (as mentioned in note 16) and the date-theorists, for their accounts cannot give the meaning (i.e., truth conditions) of tensed sentences which are true only if not tokened.

[20] Another philosopher who takes the truth conditions of tensed sentences to pertain to sentence types with respect to contexts is Richard Montague. Montague's definition of entailment between indexical sentences runs like this: for every point of reference (for every interpretation of the language of the sentences), if the premises are true under an interpretation at a point of reference, then the conclusion is true under that interpretation at that point of reference (1979a, 103). He defines a 'point of reference' (a term borrowed from Dana Scott) as a complex of relevant aspects of intended 'possible contexts of use' (1979a, 98). In order to avoid the requirement that a sentence can only be evaluated in a context where it is tokened (used), we may interpret Montague's 'contexts of use' broadly: say that *any* context is a possible context, e.g., allow 'possible contexts of use' to include contexts where the agent does not exist, cannot speak or write, etc.

Montague (1979b, 230) and Bar-Hillel (1954) construe a token as a pair consisting of a type and a point of reference, thus the notion of the truth of a token is derivative from the notion of the truth of a type.

[21] There are possible complications here involving demonstratives which I am ignoring; they are incidental to the main point of the example.

[22] Craig (1996b, 260–5) argues in favour of the existence of the transcendental ego and argues for the reality of the self or the 'tensed ascription of properties to the self' on the basis of indexical self-reference, as well as for the property of presentness.

REFERENCES

Bar-Hillel, Y.: 1954, 'Indexical Expressions', *Mind* **63**, 359–79.

Christensen, F.: 1976, 'The Source of the River of Time', *Ratio* **18**, 131–43.

Craig, W. L.: 1996a, 'Tense and the New B-Theory of Language', *Philosophy* **71**, 5–26.

Craig, W. L.: 1996b, 'The *B*-theory's *Tu Quoque* Argument', *Synthese* **107**, 249–69.

Davidson, D.: 1971, 'Truth and Meaning', in Rosenberg and Travis (eds.), *Readings in the Philosophy of Language*, Prentice-Hall, Englewood Cliffs, N.J.

Kaplan, D.: 1988, 'On the Logic of Demonstratives', in N. Salmon and S. Soames (eds.), *Propositions and Attitudes*, Oxford University Press, New York, pp. 66–82.

Kaplan, D.: 1989, 'Demonstratives', in Almog, Perry and Wettstein (eds.), *Themes From Kaplan*, Oxford University Press, New York, pp. 489–563, partially reprinted in L. N. Oaklander and Q. Smith (eds.), 1994, *The New Theory of Time*, Yale University Press, New Haven, pp. 115–35.

Lloyd, G.: 1978, 'Time and Existence', *Philosophy* **53**, 215–28.

MacBeath, M.: 1983, 'Mellor's Emeritus Headache', *Ratio* **25**, 81–8.

McTaggart, J. E.: 1908, 'The Unreality of Time', *Mind* **18**, 457–74.

Mellor, D. H.: 1981, *Real Time*, Cambridge University Press, Cambridge. Chapter Five, 'The Need for Tense', is reprinted in L. N. Oaklander and Q. Smith (eds.), 1994, *The New Theory of Time*, Yale University Press, New Haven, pp. 23–37.

Mellor, D. H.: 1988, 'I and Now', *Proceedings of the Aristotelian Society* **89**, 79–94.
Mellor, D. H.: 1992, letter to L. A. Paul.
Montague, R.: 1979a, 'Pragmatics', in Richmond H. Thomason (ed.), *Formal Philosophy*, pp. 95–118.
Montague, R.: 1979b, 'Universal Grammar', in Richmond H. Thomason (ed.), *Formal Philosophy*, pp. 222–46.
Oaklander, L. N.: 1994a, 'A Defense of the New Tenseless Theory of Time', in L. N. Oaklander and Q. Smith (eds.), *The New Theory of Time*, Yale University Press, New Haven, pp. 57–68.
Oaklander, L. N.: 1994b, 'The New Tenseless Theory of Time: A Reply to Smith', in L. N. Oaklander and Q. Smith (eds.), *The New Theory of Time*, Yale University Press, New Haven, pp. 77–82.
Perry, J.: 1977, 'Frege on Demonstratives', *Philosophical Review* **85**, 474–97.
Perry, J.: 1979, 'The Problem of the Essential Indexical', *Noûs* **13**, 3–21.
Perry, J.: 1988, 'Cognitive Significance and New theories of Reference', *Noûs* **22**, 1–18.
Prior, A. N.: 1968, *Papers on Time and Tense*, Clarendon Press, Oxford.
Reichenbach, H.: 1947, *Elements of Symbolic Logic*, Macmillan, New York.
Salmon, N.: 1986, *Frege's Puzzle*, MIT Press, Cambridge, MA.
Sanford, D.: 1984, Critical notice of *Real Time* by D. H. Mellor, *Philosophical Review* **93**, 289–93.
Searle, J.: 1983, *Intentionality*, Cambridge University Press, Cambridge.
Smart, J. J. C.: 1966, *Philosophy and Scientific Realism*, Routledge and Kegan Paul, London.
Smart, J. J. C.: 1980, 'Time and Becoming', in Peter van Inwagen (ed.), *Time and Cause*, Dordrecht, Boston, pp. 3–15.
Smith, Q.: 1993, *Language and Time*, Oxford University Press, New York.
Smith, Q.: 1994a, 'Problems With the New Tenseless Theories of Time', in L. N. Oaklander and Q. Smith (eds.), *The New Theory of Time*, Yale University Press, New Haven, pp. 38–56.
Smith, Q.: 1994b, 'The Truth Conditions of Tensed Sentences', in L. N. Oaklander and Q. Smith (eds.), *The New Theory of Time*, Yale University Press, New Haven, pp. 69–76.
Smith, Q.: 1994c, 'Smart and Mellor's New Tenseless Theory of Time: A Reply to Oaklander', in L. N. Oaklander and Q. Smith (eds.), The New Theory of Time, Yale University Press, New Haven, pp. 83–6.
Smith, Q.: 1994d, 'The Co-reporting Theory of Tensed and Tenseless Sentences', in L. N. Oaklander and W. Smith (eds.), *The New Theory of Time*, Yale University Press, New Haven, pp. 94–103.
Smith, Q.: 1994e, 'Temporal Indexicals', in L. N. Oaklander and Q. Smith (eds.), *The New Theory of Time*, Yale University Press, New Haven, pp. 136–53.
Wettstein, H.: 1986, 'Has Semantics Rested on a Mistake?', *Journal of Philosophy* **83**, 185–209.

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