It has only recently been remarked that traditional tense logic is not suitable for expressing tense statements of English. We do not speak by saying PFPFFA and the like. There are more, less obvious reasons, for the unsuitability of traditional tense logics for the analysis of the tenses of English.

Dov M. Gabbay was led to this conclusion mainly because traditional tense logic cannot cope with the intricacies of tense iteration in examples like the following:

She regretted that she married the man who was to become an officer of the bank where she had had her account.

I shall argue in this paper that there is another interesting aspect of natural languages, such as English, which traditional tense logics do not and indeed cannot deal with. In English, tense does quite naturally co-occur with dates and other adverbials. Astonishingly enough, this co-occurrence has never received much attention in tense logics.

An attempt to incorporate dates into an extended version of Lemmon's Minimal Tense Logic $K_t$ was undertaken by Peter Mott. To the list of logical constants of $K_t$ ($\rightarrow, \neg, [P,F]$) he adds an operator $T$, to be interpreted as 'it is the case on ... that ... '. The non-logical vocabulary contains a list $a_1 \ldots a_n$ of dating expressions that function as constants. If $A$ is a wff and $a_1$ a date, then $Ta_1A$ is also a wff.

In such a system, the English sentence

(1) Caesar invaded Britain in 55 B. C

can be rendered as either (2) or (3):

(2) $Ta_1(Pp)$;

(3) $P(Ta_1p)$.

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It can, however, easily be shown that neither (2) nor (3) are adequate renderings of (1). Mott himself gives the following semantics:

A model structure is a pair \((D, U)\) where \(D\) is non-empty and \(U \subseteq D \times D\). A model is a quadruple \(\langle D, U, \phi, \theta \rangle\) where \(\phi\) is a function from each sentence letter \(\mathcal{R}_t\), to some element of \(P(D)\) and \(\theta\) assigns to each \(a_t\) some \(t \in D\). The definition of satisfaction for a wff at a time in a model is given below . . .

\[
\begin{align*}
M \models \mathcal{R}_t & \text{ iff } t \in \phi(\mathcal{R}_t); \\
M \models PA & \text{ iff there is some } t' \text{ such that } U't \text{ and } M \models A; \\
M \models TaA & \text{ iff } M \models \theta(a_i) A.
\end{align*}
\]

Let us now examine both \(Ta_i(Pp)\) and \(P(Ta_ip)\) in the light of this semantics, with the stipulation that \(a_i\) and \(p\) represent 'in 55 B. C.' and 'Caesar invades Britain' respectively.

According to (6), our example (2) is true at \(t\) iff \(Pp\) is true at \(\theta(a_i)\), which in turn is true iff there is some \(t'\) prior to \(\theta(a_i)\) and \(p\) is true at \(t'\). This, however, is not 'Caesar invaded Britain in 55 B. C.', but at best something like 'Caesar had invaded Britain by 55 B. C.'.

(3) is true at \(t\), on the other hand, iff \(Ta_iP\) is true at some \(t'\) prior to \(t\). And \(Ta_ip\) is true at \(t'\), iff \(p\) is true at \(\theta(a_i)\), which is just another way of saying that "a temporally definite statement is to be taken as realized omnitemporally, i.e., at all times whatsoever". Thus we may paraphrase the truth-conditions for (3) as

\[
P(Ta_ip) \text{ is true at } t \text{ iff } t \text{ is not the first moment of time and } p \text{ is true at } \theta(a_i).
\]

It is obvious that nothing is said about the position of \(\theta(a_i)\) relative to \(t\), whereas the English sentence (1) can only be uttered to refer to a past event.

Furthermore, if \(t\) is neither the first nor the last moment of time, \(P(Ta_ip)\) has just the same truth value at \(t\) as \(I(Ta_ip)\). This is not tense explained, this is tense explained away.

Perhaps a remark of Arthur N. Prior helps to see things even more clearly:

It is a particular merit of Rescher's article, referred to above, that he makes it quite clear that what he calls 'chronologically indefinite' time-references can occur within what he calls 'chronologically definite' ones, i.e. that what can be or not be the case at a given date may be something tensed, e.g. that it will be raining, . . .