Towards a New Explanation of Sequence of Tense

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Constructions in which a past tense is embedded under a matrix past tense have two readings: a simultaneous reading and a backward-shifted one. The availability of a simultaneous reading for past-under-past sentences is referred to as Sequence of Tense (SoT).

(1) John said Mary was ill.

a. John, at some $t' <$ utterance time, t_u : "Mary is ill." (simultaneous reading)
b. John, at some $t' < t_u$: "Mary was ill." (backward-shifted reading)

In all existing accounts, the simultaneous and the backward-shifted readings are derived via distinct mechanisms. Most of these implement the distinction as an ambiguity at the level of LF, assuming either a syntactic rule of tense deletion under certain conditions (Ogihara 1995; von Stechow 1995), a zero tense in the embedded clause (Kratzer 1998), a feature transfer mechanism that transmits temporal relations (Abusch 1997), or a combination of the last two (Grønn & von Stechow 2010), among others. However, the systematic availability of this ambiguity cross-linguistically casts doubt on whether it should indeed be attributed to two different LFs, instead of receiving a more principled explanation (see also Altshuler 2016; Altshuler & Schwarzschild 2012 (henceforth, A&S 2012)).

In this paper, we propose an alternative approach for SoT that avoids ambiguity. For us, the meaning of a past tense morpheme, like *-ed*, is comprised of two components. In line with many others (e.g. von Stechow 2003; Zeijlstra 2012) we assume that syntactically, each past tense morpheme carries an uninterpretable past feature [uPAST] (henceforth [uP]), to be checked by the following covert past tense operator *Op-PAST* that carries an interpretable feature [iPAST] (henceforth [iP]). (In this paper we restrict ourselves to temporal interpretations of past tense morphology, not considering their non-past, non-factual readings):

(2) $[\![\, Op\text{-}PAST \,]\!] = [\ \lambda t^*.\ \lambda P.\ \exists t < t^*\ \&\ P(t)\ ]$

At matrix level, t^* in principle applies to t_u. Nevertheless, later in this paper we discuss examples in which the value deviates from the default.

That past tense takes higher scope than the surface position of the past tense morpheme has been well-established in the literature (see e.g. von Stechow 2003; Zeijlstra 2012). Via multiple agree, the covert past tense operator in (2) can check all of the uninterpretable past tense features in its syntactic domain. Since under standard assumptions a covert operator may only be included when it is grammatically necessary, multiple past tense morphemes require the presence of only one past tense operator. Vice versa this means that only when one *Op-PAST* cannot check all present [uP] features, a second *Op-PAST* may be included.

A further novel contribution is our proposal that the past tense marker *-ed* is not semantically vacuous, but that it rather encodes a relative non-future with respect to its closest c-commanding tense node (informally: 'not later than'):

(3) $[\![\, \text{-ed} \,]\!] = [\ \lambda t.\ \lambda P.\ \exists t'.\ t' \leq t\ \&\ P(t')\ ]$

This meaning component of past tense morphology ensures that every past tense embedded under another past is ambiguous between a simultaneous and a backward-shifted reading: The absolutive operator *Op-PAST* places the sentence prior to the utterance time, providing the temporal head of the time chain; all other past tense nodes express a relative non-future with respect to their closest c-commanding tense node, yielding a non-strict hierarchy of tense nodes:

(4) John said that Mary was ill.

a. [*Op-PAST*$_{[iP]}$ [John [say-ed$_{[uP]}$ [that [Mary [be-ed$_{[uP]}$ ill.]]]]]]
$\exists t' < t_u$ $\exists t^2 \leq t'$ $\exists t^3 \leq t^2$

b. $\exists t' < t_u$ & $[\exists t^2 \leq t'$ & say(John, t^2, $[\exists t^3 \leq t^2$ & be-ill(Mary, t^3)])]

The covert past tense operator in (4) places the proposition at some time $t' < t_u$. Since there are two past tense morphemes in the sentence, two relations of relative non-future have to be considered: t^2 is a relative non-future with respect to its closest c-commanding tense node, i.e. t', and t^3 is a relative non-future with respect to t^2. The backward-shifted reading of (4) arises in case that $t^3 < t^2$, the simultaneous interpretation is yielded for $t^3 = t^2$.

An important aspect of SoT is that past tense morphemes may even make reference to a time interval after the time of utterance. In (6) a past tense is used to describe the state of the fish's being alive, even though this time may lie after the utterance time. Our approach successfully captures the multiple interpretations of such 'fish-sentences' discussed in the literature (e.g. in Abusch 1988; Ogihara 1989; Heim 1994) under the assumption that *would* is a combination of the operator *woll* (a tense operator that places the evaluation time of a proposition in the relative future of the sentence's current evaluation time) plus a [uP] feature that restricts it to past tense sentences (again taking non-past, non-factual readings of *would* out of consideration here).

(5) $[\![$ woll$_{[uP]}$ $]\!]$ = [$\lambda t. \lambda P. \exists t'. t' > t$ & $P(t')$]

(6) John said he would buy a fish that was still alive.

a. [*Op-PAST*$_{[iP]}$ [John [say-ed$_{[uP]}$ [he [would$_{[uP]}$ [buy a fish [that be-ed$_{[uP]}$ alive.]]]]]]]
$\exists t' < t_u$ $\exists t^2 \leq t'$ $\exists t^3 > t^2$ $\exists t^4 \leq t^3$

b. $\exists x$ [fish(x) & $\exists t' < t_u$. $\exists t^2 \leq t'$: say(John, t^2, $[\exists t^3 > t^2$: buy(he, t^3, x) & $\exists t^4 \leq t^3$: alive(x, t^4)])]

The explanation we propose has several advantages over existing approaches. First, we do not have to postulate that there is a difference between a real past and a surface past, which is a present tense in disguise (cf. e.g. Ross 1967; Abusch 1988). By defining past as non-future, we can account for the same cases while retaining a clear 1:1 mapping between temporal form and temporal meaning. Secondly, this SoT account is not dependent on certain classes of predicates. In her pioneering proposal, Abusch (1997) assumes that feature transmission (leading to the SoT effect) only arises with intensional embeddings – a claim that appears to be too strong. As seen in (4), the analysis we propose in principle also applies to extensional embeddings, yielding the same SoT effects. Existing pragmatic theories of SoT (Altshuler 2016; A&S 2012) assume that past-under-past embeddings are not ambiguous between a simultaneous and a backward-shifted reading but that they always have the latter interpretation. As per them, the perception of simultaneity arises in the absence of a cessation implicature, which occurs only when there is competition with a present tense (with stative verbs). The proposal thus predicts that embedded eventive predicates are always interpreted as backward-shifted – a standard assumption which however has been refuted by Kusumoto (1999). Finally, since SoT requires feature checking by *Op-PAST* in the same syntactic domain when receiving an appositive, de re interpretation, the deviant behavior of past-under-past in (non-restrictive) relative clauses receives a proper explanation as well. Since uninterpretable features inside such relative clauses cannot be checked by features outside these clauses (see also Stowell 2007), as they form a separated syntactic domain, a second *Op-PAST* needs to be included for these cases. Consequently, the two time variables in (7) are evaluated independently of each other with respect to t_u:

(7) Mary met a woman who was president.

a. [*Op-PAST*$_{\text{[iP]}}$ [Mary meet-ed$_{\text{[uP]}}$ a woman [who [*Op-PAST*$_{\text{[iP]}}$ [be-ed$_{\text{[uP]}}$ president]]]]]
$\exists t' < t_u$ $\exists t^2 \leq t'$ $\exists t'' < t_u$ $\exists t^3 \leq t''$

b. $\exists x$ [woman(x) & $\exists t' < t_u$. $\exists t^2 \leq t'$: meet(Mary, x, t^2) & $\exists t'' < t_u$. $\exists t^3 \leq t''$: president(x, t^3)]

To conclude, this approach to past tense systematically assigns both simultaneous and backward-shifted readings to past-under-past constructions. The semantic component (*-ed* is a relative non-future), next to the syntactic component of carrying an uninterpretable past feature defines the English past tense morpheme. Note that the existence of such parameters opens up a space for variation, which is where we expect variation cross-linguistically.