

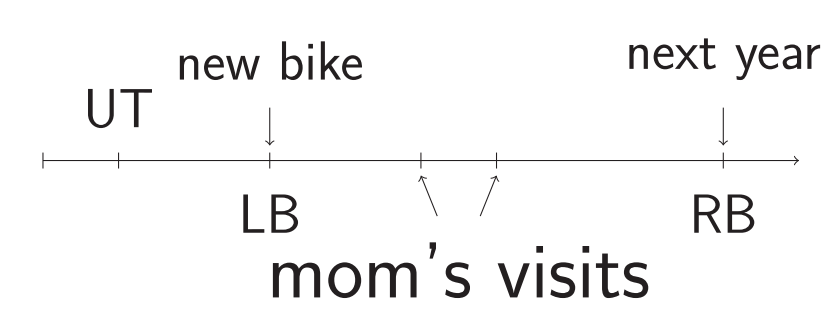
Future vs. future perfect

► **Generalization:** English temporal adjunct clauses have been observed to uniformly show present under matrix future (Stump 1985 and others)

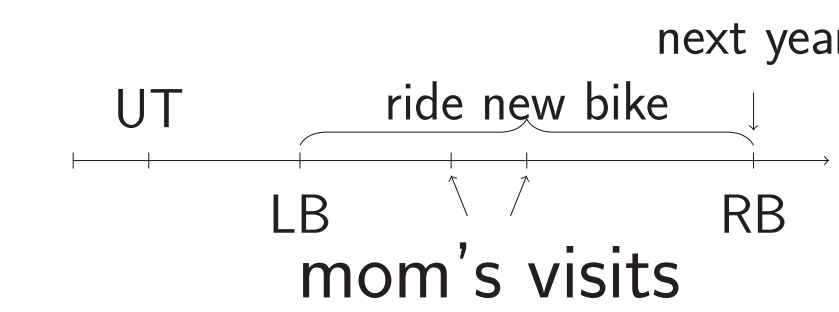
(1) I will leave {before/after/when} I see/*saw him.

► **Puzzle:** matrix future perfect licenses past inside the adjunct

(2) By this time next year, mom will have visited twice since I bought/*buy my new bike. (3) %?By this time next year, mom will have visited twice since I've been riding my new bike.



(a) Past/*simple present inside *since* in the future.



(b) Perfect rescues present tense inside *since*.

► **Why it's a puzzle:**

► Future-shifted past is normally only licensed in embedded clauses, not adjuncts

(4) a. I will tell Bernice that you left early. (where "you" has not yet left)
b. *I will call Bernice after I left. (*past even though event_{adj} < event_{mat})

► The pattern is robust: other temporal connectives can have future-shifted past as well, but only under future perfect

(5) Context: Jade and her brother are young children planning their futures. They both want to get a PhD and they want to both have completed their PhDs by the time Jade is 30. In different versions of their plan, they get their PhDs in different orders.

a. If all goes according to plan, by the time she is 30, Jade will have gotten her PhD {before/after/when} her brother did/does.

Note: speakers show a preference for past over present under *after*

Restatement of puzzle: how is tense inside adjunct clauses evaluated?

► **Option 1:** Adjunct tense always evaluated wrt UT. Perfect is like past in licensing deletion of adjunct past. This won't work because...

► Adjunct past is not acting like a deleted tense: present perfect but not present allowed in *since*-clauses

► Adjunct past can't be interpreted in a position that is c-commanded by the perfect (see section on *since*) → SOT wouldn't apply

► **Option 2 = Proposal:** The perfect provides a new adjunction spot, allowing adjunct clauses in that position to take a lower evaluation index than UT

The problem of *Since*

► I assume Iatridou et al. (2002), von Stechow & Iatridou (2019)'s denotation of the perfect, and the system for evaluating tense/aspect that they adopt

► A pragmatic principle sets the topmost evaluation index: An utterance of a sentence ϕ at a time u is true iff $u \ll [\phi]^u = 1$.

In this system, tense, aspect, the perfect, and temporal connectives are interpreted with their complements via a syncategorematic rule:

(6) Tense

- a. $u \ll [\text{PRES } \phi]^t = 1$ iff $[\phi]^t = 1$
- b. $u \ll [\text{PAST } \phi]^t = 1$ iff $\exists t' < t : [\phi]^{t'} = 1$
- c. $u \ll [\text{FUT } \phi]^t = 1$ iff $\exists t' > t : [\phi]^{t'} = 1$

(7) Aspect

- a. $u \ll [\text{PRF } \phi]^t = 1$ iff $\exists t' \subseteq t : [\phi]^{t'} = 1$
- b. $u \ll [\text{IMP } \phi]^t = 1$ iff $\exists t' \supseteq t : [\phi]^{t'} = 1$

(8) $u \ll [\text{PERF } \phi]^t = 1$ iff $\exists t' : RB(t, t') \wedge [\phi]^{t'} = 1$

(9) $u \ll [\text{SINCE } 1990]^t = 1$ iff $LB(u \ll [1990]^t, t)$

(10) Conjunction rule:

- $u \ll [\phi \psi]^t = 1$ iff $u \ll [\phi]^t = 1 \wedge u \ll [\psi]^t = 1$

► **My observation:** *since*-clauses introduce a contradiction if interpreted in situ!

► *Since* can either take a time as its complement, or a clause:

► For clausal complements, F&I propose operator movement from a PP [at Op] to the edge of the clause, where the result is a definite description: *the time at which* ϕ

(11) $[\text{since } [Op] [\lambda t [\text{past}_{[prf]} [v_p] \text{ I leave at } t]]]$

(12) $u \ll [\text{SINCE } \phi]^t = 1$ iff $LB(u \ll [\phi]^t, t)$

- a. $u \ll [\phi]^t = u \ll [Op \psi]^t =$ the time x s.t. $u \ll [\psi]^{t'}(x) = 1$
- b. = the time x s.t. $u \ll [\lambda i. [\text{past}_{[prf]} \text{ I leave at } i]]^{t'}(x) = 1$
- c. = the time x s.t. $\exists t' < t : \exists t'' \subseteq t' : u \ll [\text{I leave at } x]^{t''} = 1$

d. **Result:** $LB(x, t) \wedge x < t \rightarrow \text{contradiction}$

► In prose: *since* says a time x is the left boundary of the perfect interval, but the past inside the *since* clause requires that time x to precede the perfect interval, which is contradictory

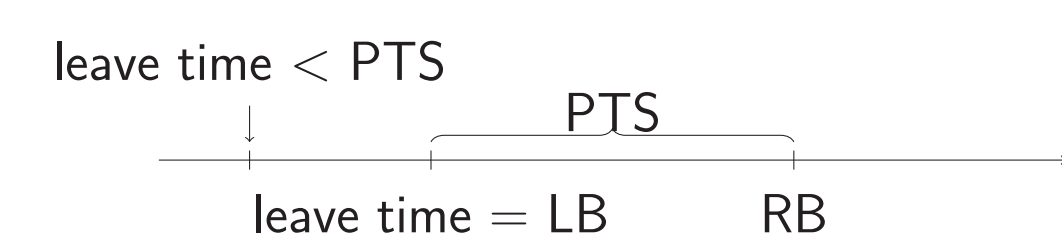


Figure: The left boundary of an interval cannot strictly precede that interval.

Proposal: clausal complement of *since* is a quantifier

Proposal: Clausal complements of *since* are quantifiers, must QR to get a different evaluation index

(13) $u \ll [Op \psi]^t = \lambda P_{i,t}. \exists x. x \text{ is unique} \wedge u \ll [\psi]^t(x) = 1 \wedge P(x) = 1$

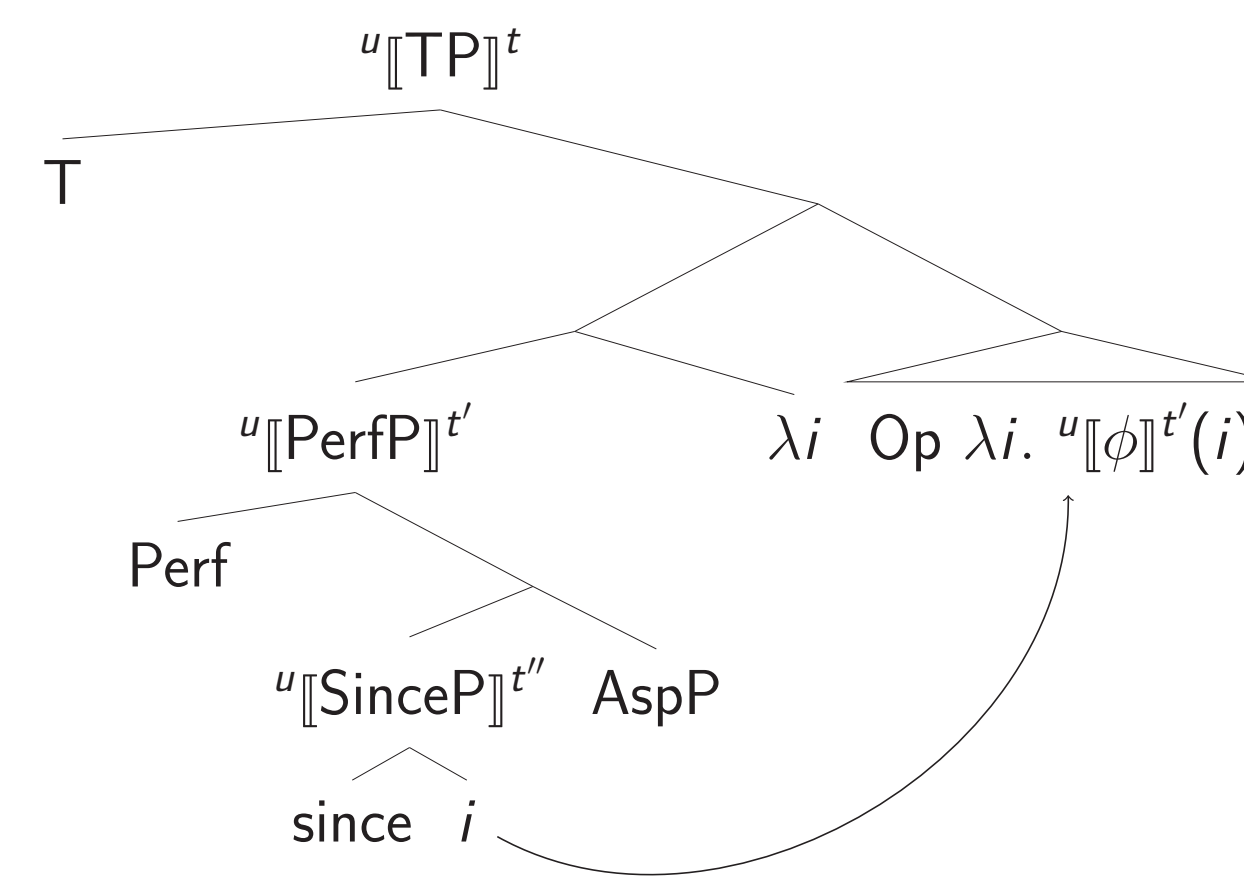


Figure: When *since* takes a clause, its complement is quantificational and QR's to a higher position.

- (14) $u \ll [TP]^t = u \ll [Op(\lambda i. \phi)(\lambda i. \text{PerfP})]^t$
- a. = 1 iff $\exists x. x$ is unique $\wedge u \ll [\phi]^t(x) = 1 \wedge u \ll [\text{PerfP}]^t(x) = 1$
 - b. for $\phi = [\text{past}_{[prf]} \text{ I leave at } i]$: $u \ll [\phi]^t(x) = 1$ iff $\exists t' < t : \exists t'' \subseteq t' : u \ll [\text{I leave at } x]^{t''} = 1 \rightarrow x < t \otimes$
 - c. $u \ll [\text{PerfP}]^t(x) = 1$ iff $\exists t' : RB(t, t') \wedge u \ll [\text{SinceP}]^t(x) = 1 \wedge u \ll [\text{AspP}]^t = 1 = 1$ iff $\exists t' : RB(t, t') \wedge LB(x, t') \wedge u \ll [\text{AspP}]^t = 1 \rightarrow x < t \otimes$

► **Result:** *since*'s complement gets its evaluation index from tense rather than the perfect. Now *since* says there is a time x s.t. x is the left boundary of the perfect interval, and the past inside *since* says that time x is before the *right boundary* of the perfect interval → no contradiction!

► This account has two advantages:

1. It avoids a contradictory meaning for *since*, and
2. correctly predicts that past inside the *since* clause can be future-shifted, because it is evaluated wrt the right boundary of the perfect interval and not UT

Before/after/when

► Assuming analogous meanings for the other temporal connectives:

(15) a. $u \ll [\text{before } 1990]^t = 1$ iff $t < 1990$ b. $u \ll [\text{before } \phi]^t = 1$ iff $t < u \ll [\phi]^t$

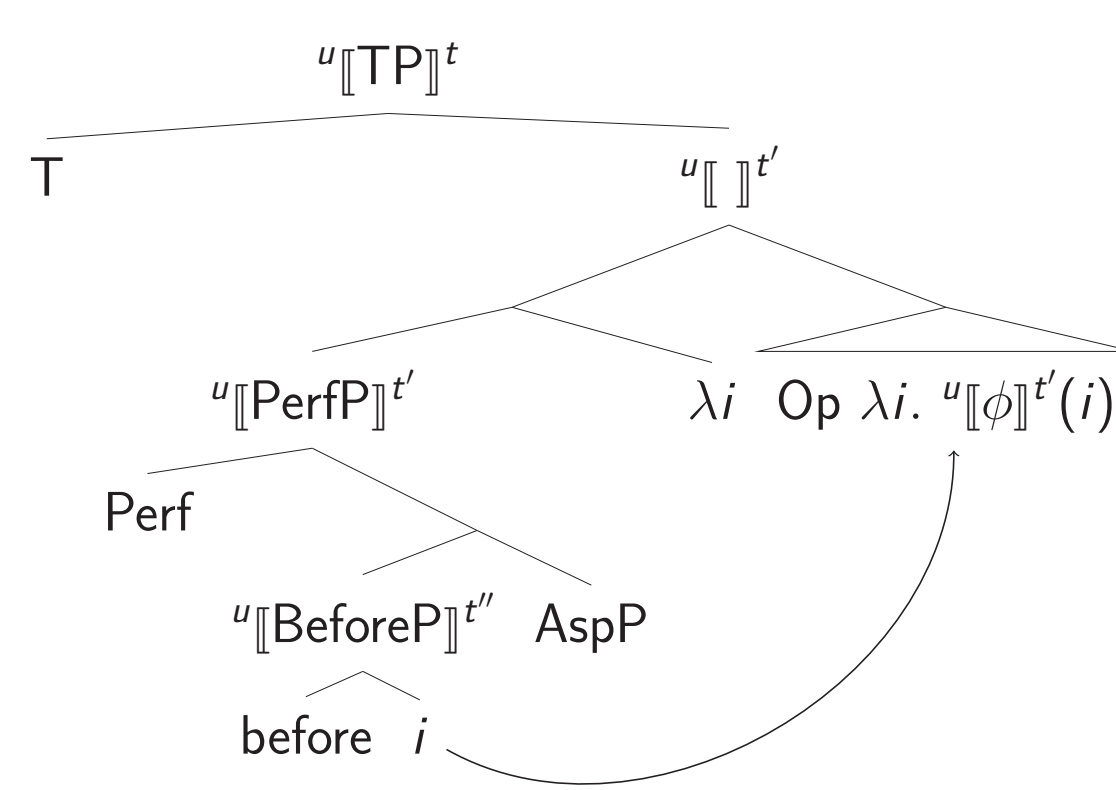
► The same logic motivates a quantificational complement of *before*: adjunct past/present result in contradictions for non-quantificational clausal complements

- (16) $u \ll [\phi]^t = u \ll [Op \psi]^t =$ the time x s.t. $u \ll [\psi]^t(x) = 1$
- (17) $\psi = \lambda i. \text{I left at } i$
 $u \ll [\psi]^t(x) =$ the time x s.t. $u \ll [\lambda i. [\text{past}_{[prf]} \text{ I leave at } i]]^{t'}(x) = 1 = 1$
 = the time x s.t. $\exists t' < t : \exists t'' \subseteq t' : u \ll [\text{I leave at } x]^{t''} = 1$
Result: $t < x \wedge x < t \rightarrow \text{contradiction}$

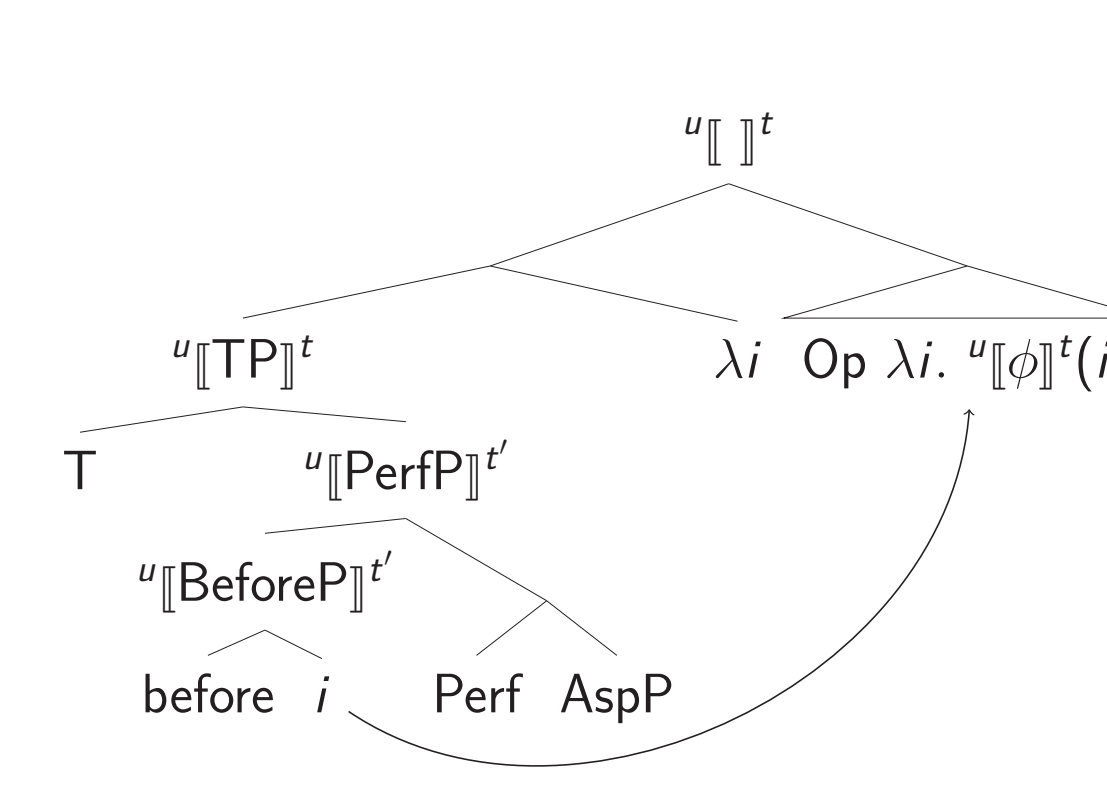
► In prose: *before* means that some time x follows some time y , but past or present inside the adjunct clause requires x to precede or overlap with y → *contradiction*

► **Making *before*'s complement a quantifier like *since*'s solves the problem:**

► *Since* *before*'s meaning is not intrinsically dependent on a perfect interval, it can be base generated with aspect or the perfect, leading to two possible derivations, and two possible adjunct tense realizations



(a) *Before* can be base-generated where *since* was: licenses future-shifted adjunct past.



(b) *Before* could also have merged higher and moved higher: no future-shifted past should be licensed, we observe future-shifted present instead.

Figure: Two derivational possibilities for *before*, what happens when the complement of *before* moves above T? Proposal: SOT (Sharvit 2013, discussed in the next section)

► **Puzzle:** *After/when* clauses do not suffer the same problem as *before/since* → they can in principle be interpreted in situ, but show the same surface behavior as *before*

- **Proposal:** Given their surface similarity, I propose that English has syntactic uniformity across all temporal connectives → all clausal complements must QR
- This is likely an English specific feature: other languages have different realizations for the tense inside *before* vs. *after*

Previous work

► Hornstein (1990), Sharvit (2013) and von Stechow and Grønn (2013) propose theories of adjunct tense that are too strong

► Hornstein (1990) (assuming a Reichenbach theory of tense):

► Hornstein's Constraint on Derived Tense Structures (CDTS): adjunct tense must have the same relative ordering between reference time (R) and UT (S) as the matrix tense

(18) Sarah came when Harry arrived.
TNS₁ = E₁, R₁ - S; TNS₂ = E₂, R₂ - S

(19) *Sarah came when Harry arrives.
TNS₁ = E₁, R₁ - S; TNS₂ = S, R₂, E₂

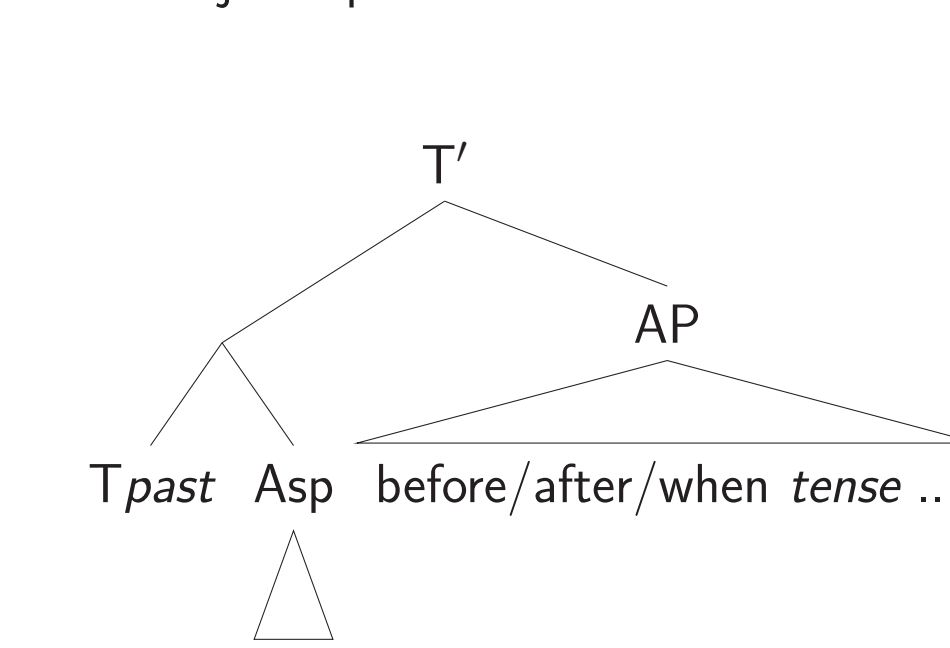
(18) E₁, R₁ - S
E₂, R₂ - S

(19) E₁, R₁ - S
X, S, R₂, E₂

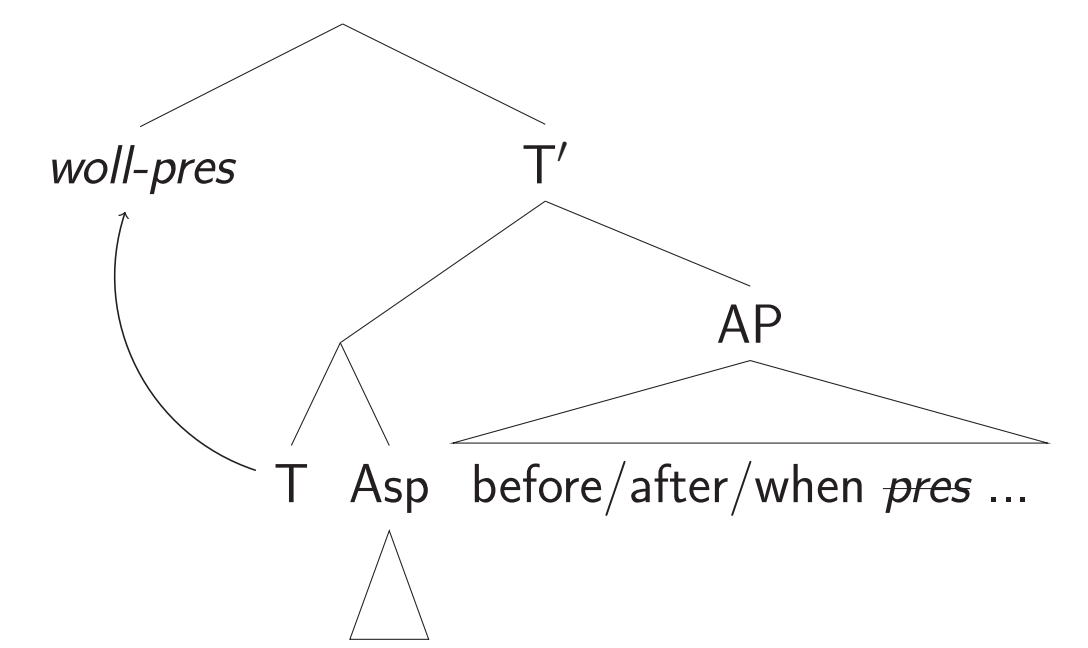
► Incorrectly predicts that there can be no adverbials containing past in a future perfect
 Future perfect: S - E₁ - R₁; Past: E₂, R₂ - S → R₁ and R₂ are ordered differently wrt S, violates the CDTS!

► Sharvit (2013) and von Stechow and Grønn (2013): tense inside English adjunct clauses is either deictic (evaluated wrt UT) or anaphoric to matrix tense (deleted by SOT rules)

► SOT normally only applies to tenses in the c-command domain of matrix tense: TP adjuncts too high for tense deletion
 ► Sharvit: *woll* is a quantifier over future times, so it QR's to a position above the adjunct. *Will* = *pres* + *woll* and thus can delete adjunct present



(a) Matrix past does not c-command the adjunct. Any adjunct tense interpreted wrt UT.



(b) *Woll* QR's above the adjunct. Adjunct present can delete and get non-UT-dependent interpretation.

(20) John will water the plant before it dies.

- a. $[\text{woll-pres}_{0,3} [\lambda_1 [\text{John water-}t_1 \text{ the plant }]]] [\text{before } [\lambda_2 [\text{it die-}t_2]]]$
- b. $\exists t > UT: (i) \text{ John waters the plant at } t; (ii) t < \text{EARLIEST}_C(\{t' \circ UT: \text{the plant dies at } t'\})$

► This theory also incorrectly predicts that adjunct tense should show no sensitivity to anything below tense (we saw it is sensitive to the perfect!)

► Neither approach allows for future-shifted adjunct past in a matrix future perfect clause

► We can, however, adopt Sharvit's proposal about *woll* triggering SOT deletion of adjunct present

Accounting for the Stump pattern

► In simple future clauses, adjunct tense is uniformly present, i.e. no future-shifted past (1).

► The lack of future-shifted past is predicted by the theory: in the absence of PerfP, adjunct clauses must QR above T, and thus never receive an evaluation index that is not UT

► **Problem:** how do we get future-shifted present?

► **Solution:** adopting Sharvit, *woll* QR's above the adjunct and licenses deletion of adjunct present

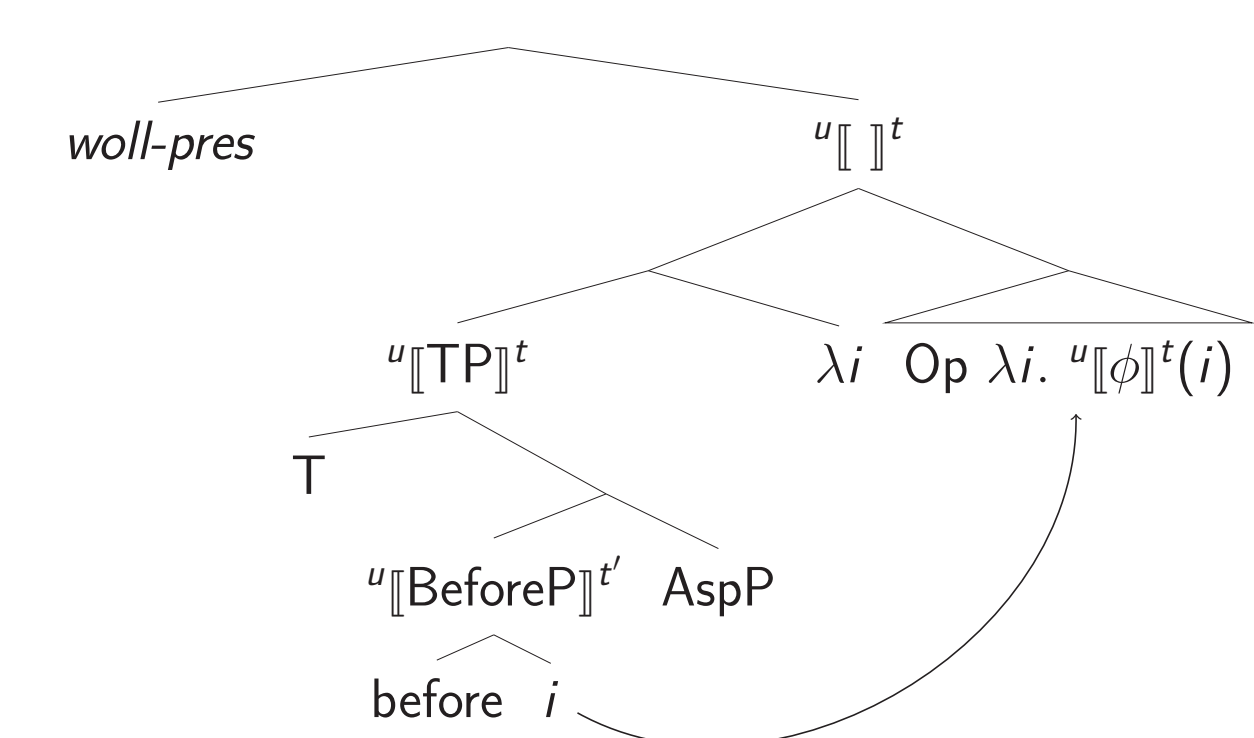


Figure: *Before*'s complement must QR, but the only place it can move is above T. Following Sharvit (2013), if *woll* QR's as well, it can license deletion of adjunct present, which results in deletion of the adjunct's evaluation index.

► Could the adjunct have been base generated higher, and QR'd above *woll*?

► This would predict that SOT could not apply. We would therefore expect to get obligatory future in the adjunct clause to express a future-shifted meaning. Perhaps this possibility is ruled out by the very meaning of the temporal connective, which relates events to topical intervals/events and not to UT

► **Puzzle for everyone:** why don't speakers of English like future in adjunct clauses?

(21) I will leave before you (??will) sing.

Selected References

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