

Approaches to the Semantics of Embedded Tense¹

(1) **Question:**

What are some ways in which the (alleged) ambiguity of (2) can be captured, other than the ‘tense deletion’ proposal we’ve already examined?

- It would be great if we could unify the phenomenon in (2) with a **broader class of phenomena** we already know about!

(2) **‘Sequence of Tense’ in English** Dave thought that George was president.

- a. *Simultaneous Reading:* Dave thought “George is president”
b. *Back-Shifted Reading:* Dave thought “George was president”

(3) **The Proposals**

- We’ll first consider a proposal of Stowell’s (1993, 1995), as implemented by Kusumoto (2005).
 - *Broader Class of Phenomena:* Polarity items (*n*-words)
 - *Semantic Type of (Contentful) Tense:* <<i,t>,t>
- We’ll then consider a proposal of Kratzer’s (1998), implemented using ideas from Kratzer (2009).
 - *Broader Class of Phenomena:* φ -features in bound pronouns
 - *Semantic Type of (Contentful) Tense:* i
- Finally, we’ll consider a proposal of von Stechow’s (2009), which captures the insights of Kratzer’s (1998) proposals within Kusumoto’s general syntax/semantics
 - *Broader Class of Phenomena:* φ -features in bound pronouns
 - *Semantic Type of (Contentful) Tense* <<i,t,>,t>

1. Tense and Polarity Items (Stowell 1993, 1995; Kusumoto 2005)

(4) **Key Background Fact: ‘Scope Splitting’ in German**

- a. Sentence: Zu dieser Feier **musst** du [**keine Krawatte**] anziehen.
 to this party must you no tie wear
 You don’t have to wear a tie to this party.
- b. The Salient Reading:
 NOT > MUST > SOME *It’s not the case that you must wear a tie.*

¹ The material in this handout is based upon the following readings: Kusumoto 2005: Sections 3; von Stechow 2009: Sections 6 and 11; Kratzer 1998: Sections 1-5; Kratzer 2009: Sections 1-2.

(5) **The Puzzle Surrounding (4)**

How do we generate the reading in (4b) if we assume the semantics in (5a)?

a. $[[\text{keine Krawatte}]]$ = $[\lambda P_{\langle \text{et} \rangle} : \neg \exists x . x \text{ is a tie} \ \& \ P(x) = T]$

b. Predicted LFs and Readings:

(i) 1. *LF:* $[[\text{no tie}] [2 [\text{must} [\text{you wear } t_2] \dots]]$

2. *Truth-Conditions:*

$\neg \exists x . x \text{ is a tie} \ \& \ \forall w' \in \text{Deontic}(w) . \text{you wear } x \text{ in } w'$
'There is no **particular** tie that you have to wear'

(ii) 1. *LF:* $[\text{must} [[\text{no tie}] [2 [\text{you wear } t_2] \dots]]$

2. *Truth-Conditions:*

$\forall w' \in \text{Deontic}(w) . \neg \exists x . x \text{ is a tie} \ \& \ \text{you wear } x \text{ in } w'$
'You have to not wear any tie'

(6) **A Possible Solution (Jacobs 1980, Rullmann 1995, Penka 2007)**

- Perhaps *keine Krawatte* doesn't have the meaning in (5a); rather, maybe it simply has the meaning of *eine Krawatte* 'a tie' in (6a) below.

a. $[[(k)\text{eine Krawatte}]]$ = $[\lambda P_{\langle \text{et} \rangle} : \exists x . x \text{ is a tie} \ \& \ P(x) = T]$

- Suppose, though, that the *k-* morphology on *keine Krawatte* requires it to be in the scope of a (phonologically) null version of clausal negation in German.

- Under these assumptions, the LF of (4a) could be as in (6b), with the T-conds in (6c)

b. LF: $[\text{NOT} [\text{must} [[\text{a tie}] [2 [\text{you wear } t_2] \dots]]]$

c. Truth-Conditions: $\neg \forall w' \in \text{Deontic}(w) . \exists x . x \text{ is a tie} \ \& \ \text{you wear } x \text{ in } w'$
'It's not the case that you are required to wear a tie'

(7) **The Main Point of This**

- Sometimes, morphology φ that *seems* to contribute the meaning ψ to the larger sentence doesn't actually have ψ as part of its own semantics.
- Instead, ψ could be contributed by some other, *phonologically null* operator OP in the sentence, *and there's a licensing relationship between OP and φ*
- That is, the morphology φ simply serves to make OP (with meaning ψ) 'visible' at PF

(14) **Illustration of the System for Complement Clauses: Simultaneous Readings**

- a. Sentence: Dave thought George was president.
- b. LF: [PAST [1 [past₁ [Dave think
[λw [2 [past₂ [George be president] ...]
- c. Truth-Conditions:
 $\exists t' . t' < t \ \& \ \forall \langle w', t' \rangle \in \text{Dox-Alt}(\text{Dave}, w, t') . \text{George is president in } w' \text{ at } t''$
- ‘[past₁]’ is licensed because (i) it is bound by a co-indexed lambda, and (ii) it is c-commanded by ‘[PAST]’ (in the matrix clause)
 - ‘[past₂]’ is licensed because (i) it is bound by a co-indexed lambda, and (ii) it is c-commanded by ‘[PAST]’ (in the **matrix** clause)

(15) **Some Commentary**

- a. Kusumoto’s (2005) system is an interesting blend of the ‘tense as pronoun’ and ‘tense as indefinite’ perspectives.
- (i) Semantically vacuous *morphological* tense is a temporal pronoun.
- (ii) Semantically contentful, phonologically null *tense operators* are temporal quantifiers
- b. In Kusumoto’s (2005) system, we don’t ever have to ‘delete’ tense before LF...
- In a simultaneous reading, the semantically contentful tense operators aren’t ever there in the subordinate clause to begin with...
 - All the subordinate clause contains are the ‘vacuous’ tense pronouns that are spelled out as morphological tense...
 - Those subordinate tenses are simply in a kind of syntactic ‘concord’ (like negative concord) with the matrix ‘[PAST]’ operator...

(16) **Question:** Why suppose that the temporal argument of the VP is saturated by this (relatively vacuous) tense pronoun, if it just ends up being bound by a lambda again?

Answer: Kusumoto (2005) goes on to show that this gives us a way of capturing the semantic differences between VPs (CPs) and NPs, participles, *etc.*

2. Tense and Features on Bound Pronouns (Kratzer 1998, 2009)

(17) Key Background Fact: φ -Features on Bound Pronouns

- a. Sentence: Only Mary likes her mother.
- b. Two Salient Readings:
- (i) *Referential Reading of 'Her'*
Mary likes Mary's mother,
and for all x, if $x \neq$ Mary, then x does not like **Mary's** mother.
- (ii) *Bound Reading of 'Her'*
Mary likes Mary's mother,
and for all x, if $x \neq$ Mary, then x does not like **x's** mother.
- c. Natural LF for Bound Reading: [[Only Mary] [2 [t_2 likes [her₂ mother] ...]]

(18) The Puzzle / Problem

- a. Given the truth-conditions we want to derive, it would be natural to assume:

$$\begin{aligned} &[[\text{Only Mary}]]^{\text{w,t,g}} = \\ &[\lambda P_{\langle e,t \rangle} : P(\text{Mary}) = T \text{ and for all } x, \text{ if } x \neq \text{Mary}, \text{ then } P(x) = F] \end{aligned}$$

- b. The pronoun 'her' in (17a,c) has '[FEM]' gender. With free pronouns, this φ -feature seems to introduce the presupposition that the referent is female.

$$\begin{aligned} &[[\text{her}_i]]^{\text{w,t,g}} \text{ is only defined if } g(i) \text{ is female.} \\ &\text{If defined, then } [[\text{her}_i]]^{\text{w,t,g}} = g(i) \end{aligned}$$

- c. Now, for reasons detailed in LING 610, if we suppose that (18b) is part of the meaning of *her₂* in LF (17c), then we predict that the sister of [*Only Mary*] has the following denotation:³

$$\begin{aligned} &[[[2 [t_2 likes [her₂ mother] ...]]]^{\text{w,t,g}} = \\ &[\lambda x : x \text{ is female} . x \text{ likes } x \text{'s mother}] \end{aligned}$$

- That is, we predict that the sister of '[Only Mary]' will only be defined for *female* entities!
- d. But, (18a,b,c) then predict that the LF in (17c) will only be defined if every x who is not Mary is female.

But intuitively, that is not a condition of the bound reading of (17a)!!!

³ For a refresher on how bound pronouns with gender features are predicted to behave, please see Section 5 of the following handout: <http://people.umass.edu/scable/LING610-FA14/Handouts/14.Quantificational-DPs2.pdf>

(19) **A Possible Solution (Kratzer 1998, 2009)**

- Clearly, to avoid the problematic prediction in (18d), we want the sister of ‘[Only Mary]’ to be defined for *all* entities (not just the female ones):

$$[[[2 [t_2 \text{ likes } [\text{her}_2 \text{ mother }] \dots]]]]^{w,t,g} = [\lambda x : x \text{ likes } x \text{'s mother }]$$

- To get this, though, we need to somehow remove the gender presuppositions from the bound pronoun *her*₂
- To get that, though, we have to suppose that somehow those gender *features* on bound *her*₂ are ‘invisible’ at LF...
- Well... maybe they’re **not even there at LF because they only get put on the bound pronoun at PF!**

(20) **Kratzer’s (1998, 2009) Proposal: The Key Ingredients**⁴

a. Minimal Pronouns:

The English lexicon contains ‘ \emptyset_i ’, a phonologically null (type e) pronoun which lacks φ -features.

$$[[\emptyset_i]]^{w,t,g} = g(i)$$

b. The Pronunciation of ‘ \emptyset_i ’:

Since it doesn’t have a pronunciation, ‘ \emptyset_i ’ will lead to a crash at PF, *unless it somehow gets some φ -features*

c. Predication (Kratzer 2009: 196)

When a DP is in Spec position, and is sister to a phrase whose specifier is a lambda operator, the lambda operator inherits the φ -features of the DP (at PF)

$$[\text{DP}_{[\varphi]} [i \text{ XP }]] \rightarrow [\text{DP}_{[\varphi]} [i_{[\varphi]} \text{ XP }]]$$

d. Feature Transmission Under Binding (Kratzer 2009: 195)

A (semantically) bound pronoun inherits the φ -features of the lambda operator that binds it (at PF)

$$[i_{[\varphi]} [\text{XP} \dots \text{pro}_i \dots]] \rightarrow [i_{[\varphi]} [\text{XP} \dots \text{pro}_{[\varphi]i} \dots]]$$

⁴ As with Kusumoto 2005, I’m taking some liberties in the presentation of Kratzer’s (1998, 2009) proposals, mainly in that I’m blending some of the notations and terminology used in these two papers.

(21) **Illustration**

- a. Sentence: Only Mary likes her mother.
- b. Structure, Just Before Spell-Out:
[[Only Mary]_[FEM] [2 [t₂ likes [Ø₂ mother] ...]]
- Since *only* is an adjunct, the DP *Only Mary* has the φ -features of *Mary*
- c. PF Operations:
- (i) [[Only Mary]_[FEM] [2 [t₂ likes [Ø₂ mother] ...]] → (by Pred.)
- (ii) [[Only Mary]_[FEM] [2_[FEM] [t₂ likes [Ø₂ mother] ...]] → (by FTUB)
- (iii) [[Only Mary]_[FEM] [2_[FEM] [t₂ likes [Ø_{[FEM]2} mother] ...]] →
- (iv) *Only Mary likes her mother.*
- d. LF: [[Only Mary]_[FEM] [2 [t₂ likes [Ø₂ mother] ...]]
- e. Predicted Truth-Conditions:
Mary likes Mary's mother,
and for all x, if x ≠ Mary, then x does not like x's mother.

(22) **The Point of All This**

In some configurations (i.e., under binding), the surface features of pronouns may not actually be present at LF, and so the pronouns aren't interpreted as having those features

(23) **Key Insight of Kratzer (1998)**

If T(ense) heads are a temporal pronouns, then perhaps some T heads do not at LF have the tense features that they show on the surface...

- That is, perhaps 'simultaneous readings' arise from an embedded T-head that is underlyingly 'minimal', but which 'inherits' the feature [Past] at PF, via the mechanisms at work in (17)!!!

Important Caveat:

- Kratzer 2009, from which (20c,d) are taken, does not discuss simultaneous readings.
- Kratzer 1998 does, but its formal system is significantly different (more, mid-90s GB)
- **The system I'm about to show should not be personally attributed to Kratzer. It's simply my own attempt to implement her 1998 proposals in her 2009 system**

(24) **Simultaneous Readings via ‘Feature Transmission’: The Key Ingredients**

a. Minimal Temporal Pronouns:

The English lexicon contains ‘T-∅_i’, a phonologically null (type i) pronoun which lacks φ-features (i.e., no tense features on this T-head).

$$[[\text{T-}\emptyset_i]]^{w,t,g} = g(i)$$

b. Binding of Minimal Temporal Pronouns

Rather than make use of ‘λt’, we will assume free insertion of a lambda operator over tenses that is co-indexed with T (as in Kusumoto 2005).

c. Revised Predication:

When XP is sister to a phrase whose specifier is a lambda operator, the lambda operator inherits the φ-features (including the tense features) of XP (at PF)

$$[\text{XP}_{[\phi]} [i \text{ YP }]] \rightarrow [\text{XP}_{[\phi]} [i_{[\phi]} \text{ YP }]]$$

d. Tense Features on Main Verbs:

The PF operation of ‘tense lowering’ serves to create a complex head (at PF) consisting of the main V and the T.

$$[\text{TP } \text{T}_{\text{Past}} [\text{VP } \text{V } \text{YP }]] \rightarrow [\text{TP } [\text{VP } [\text{V } \text{T}_{\text{Past}}] \text{ YP }]]$$

(25) **Simultaneous Readings via ‘Feature Transmission’: Illustration, Part 1**

a. Structure of (2), Just Before Spell-Out:⁵

[_{TP} **Past**₁ [_{VP} Dave [_{VP} think [_{CP} λ_W [_{CP} 2 [_{TP} T-∅₂ [George [be president] ...]

b. PF Operations:

Tense Lowering (24d):

[_{TP} [_{VP} Dave [_{VP} [_V **Past**₁ think] [_{CP} λ_W [_{CP} 2 [_{TP} T-∅₂ [George [be president] ...]

Verb Raising:

[_{TP} [_{VP} Dave [_{VP} [_V **Past**₁ think] [_{CP} λ_W [_{CP} 2 [_{TP} [_T T-∅₂ be] [George [president] ...]

Revised Predication (24c)

[_{TP} [_{VP} Dave [_{VP} [_V **Past**₁ think] [_{CP} λ_W [_{CP} 2 [_{TP} [_T T-∅₂ be] [George president] ...]

Feature Transmission Under Binding

[_{TP} [_{VP} Dave [_{VP} [_V **Past**₁ think] [_{CP} λ_W [_{CP} 2 [_{TP} [_T **Past**-∅₂ be] [George president] ...]
‘*thought*’ ‘*was*’

⁵ Again, purely for expository purposes, I reconstruct subjects to SpecVP.

(26) **Simultaneous Readings via ‘Feature Transmission’: Illustration, Part 2**

- a. Structure of (2), Just Before Spell-Out:
[_{TP} Past₁ [_{VP} Dave [_{VP} think [_{CP} λ_W [_{CP} 2 [_{TP} T-∅₂ [George [be president] ...]]]]]]
- b. LF Structure of (2) [No Changes]
[_{TP} Past₁ [_{VP} Dave [_{VP} think [_{CP} λ_W [_{CP} 2 [_{TP} T-∅₂ [George [be president] ...]]]]]]
- c. Predicted Truth-Conditions: [[(26b)]]^{w,t,g} is only defined if g(1) < t.
If defined, then [[(26b)]]^{w,t,g} = T *iff*

$\forall \langle w', t' \rangle \in \text{Dox-Alt}(\text{Dave}, w, g(1)) . \text{George is president in } w' \text{ at } t'$

(27) **Question:** But, how do we obtain the back-shifted reading in (2b)?

(28) **Initial Answer:** Maybe we just put an interpreted [Past] in the subordinate TP?

[_{TP} **Past**₁ [_{VP} Dave [_{VP} think [_{CP} λ_W [_{CP} λ_t [_{TP} **Past**₂ [George [be president] ...]]]]]]]

(29) **The Problem:** The truth-conditions we get from the LF in (28) aren't quite right.

$\forall \langle w', t' \rangle \in \text{Dox-Alt}(\text{Dave}, w, g(1)) . \text{George is president in } w' \text{ at } g(2)$

- These truth-conditions require that there be a *specific* time g(2) such that Dave thinks George's presidency holds then.⁶
- However, a back-shifted reading of (2) doesn't really seem to require that the attitude-holder have such a specific time in mind.

Scenario Verifying Back-Shifted Reading of (2):

Dave once read a list titled ‘Former presidents of the USA’, which mentioned George's name, but which didn't give a date for anyone's presidency.

(30) **Kratzer's (1998) Proposal**

- We've just seen one way in which what surfaces as a morphologically past tense verb (in English) is not *actually* past tense at LF...
- There's also a second way in which surface ‘past tense’ in English might be obscuring the underlying logical form of a sentence...

⁶ There are also some concomitant problems with how the presuppositions of [Past₂] project up to the whole clause, but we'll leave those aside here.

(32) **The Overall Proposal (Kratzer 1998)**

- A simultaneous reading of a sentence like (2) arises from an underlyingly ‘minimal’ (tense-less) T-head in the subordinate clause inheriting (at PF) the [past] features of the matrix tense.
 - The mechanisms that accomplish this are the exact same ones that put (semantically vacuous) φ -features on bound (type e) pronouns.
- A back-shifted reading of (2) can arise (in English) in one of two ways:
 - If the attitude holder *does* have a specific, topical past time in mind, then it could (maybe) arise from an LF where embedded tense really does bear [past]
 - If the attitude holder *doesn't* have a specific, topical past time in mind, then it could arise from an LF where matrix embedded past is simply spelling out an underlying embedded present perfect.

(33) **Some Commentary**

- As with Kusumoto’s (2005) proposal, Kratzer’s (1998) system doesn’t appeal to a *sui generis* ‘tense deletion’ rule.
- Rather, as with Kusumoto 2005, the embedded clause doesn’t have any (semantically contentful) ‘tense features’ to begin with.
- Rather, it only gets the tense features we do see via a PF-level process that doesn’t in anyway way affect the (underlyingly featureless) syntax.
- **Generation of back-shifted readings, however, remains a challenge – as it does for all ‘tense as referential pronoun’ approaches.**

3. **The Best of Both Worlds (von Stechow 2009)**

(34) **Possible Synthesis Between Kusumoto (2005) and Kratzer (1998, 2009)**

- In one way, Kusumoto (2005) provides a ‘quantificational’ semantics for tense:
 - The semantically contentful tense operators (e.g. ‘[PAST]’) are of type $\langle i, t \rangle$
- In another sense, Kusumoto (2005) provides a ‘pronominal’ semantics for tense:
 - The syntactic T-heads (realized by tense morphology) are pronouns of type i
- **Thus, as noted by von Stechow (2009), it’s possible to combine Kusumoto’s syntax/semantics for tense with Kratzer’s theory of tense-feature transmission!**

(37) **Some Commentary**

- We've already seen that the structure in (36b), if taken to be the LF for (36a) as well, will end up giving us the desired 'simultaneous' truth-conditions.
- The reader is encouraged to confirm that the LF in (13b) – generating the back-shifted reading – will also be spelled out in the Kratzer/von Stechow system as (36a).
- **Again, the actual 'feature transmission' system put forth by von Stechow is notationally very different from Kratzer's (1998, 2009) system...**
 - But, von Stechow (2009) himself frequently notes that it is essentially just implementing the same key concepts...
 - For those who are curious, von Stechow's (2009) system is intended to be closer to the Agree-based syntactic systems found in Minimalist work.
- What is Shared Between Kusumoto (2005) and von Stechow (2009):
 - A 'quantificational semantics' for tense, which very easily handles back-shifted readings.
 - In the simultaneous reading, the subordinate clause lacks the (semantically contentful) '[PAST]' quantifier...
 - ...however, past-tense morphology in the subordinate clause is ultimately 'licensed' by the presence of such a '[PAST]' operator in the matrix clause
- What is Shared Between Kratzer (1998) and von Stechow (2009):
 - In a simultaneous reading, the means by which the feature '[past]' gets transmitted from the matrix clause to the subordinate clause *are the exact same* mechanisms responsible for putting φ -features on bound pronouns.
 - **Thus, the phenomenon of 'simultaneous readings' is a subcase of the more general phenomenon in (17)-(18)**
 - Bound pronouns 'show' the φ -features of their binders, but aren't interpreted as actually having them.
- **This kind of synthesis is possible because of the way in which Kusumoto's (2005) system is itself 'blended', combining elements of both 'quantificational' and 'pronominal' treatments of tense...**

(38) **One Final Problem for Everyone**

Simultaneous readings of embedded past are possible in English, *when the matrix clause is **present perfect!***

- a. Dave has said that he **wasn't** feeling well.
(Validating Scenario: Dave says "I **am** not feeling well")
- b. I've believed in the past that lowering taxes **was** the solution to all our problems.
(Validating Scenario: I thought "Lowering taxes **is** the solution...")
- c. The administration has contended that salaries **were** too high.
(Validating Scenario: The administration contends "Salaries **are** too high")
- d. Some Attested Examples on the Internet:
 - (i) *A former Green Party candidate for president (Peter Camejo) thought that anyone with Indian blood should have free movement throughout the Americas. Needless to say, no previous group **has thought** that they **had** a race-based right to come here at will.*
 - (ii) *If anyone else (besides me) **has thought** that the "K-zones" on TV **were** screwy, read this...*
 - (iii) *For too long, Washington **has thought** that a policy of coercion and sanctions applied to Iran **would** eventually yield a responsible and representative regime.*
- e. The Puzzle:
If the matrix T-head is [Pres], how do we end up getting/licensing [Past] features on the embedded T?