Eberhard-Karls Universität Tübingen
Englisches Seminar: Haupt-/Oberseminar

The Semantics of Tense and Modality

Part 2: Tense*

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Wintersemester 2010/11

Contents

* These notes make use of lecture notes by Heim (1997); Menéndez-Benito (2008); Romero and von Stechow (2009), and by von Fintel and Heim (2010). All mistakes are mine, of course.

1 The Realm of Tense

Displacement, again. "One of the design features is displacement. Human language is not restricted to discourse about the actual *here and now*. How does natural language untie us from the actual here and now?" (von Fintel and Heim 2010, pp. 1-2) In the first part of this course we took a look at modal displacement; the second part will explore temporal displacement; the third questions of architecture.

2 A Semantics

"Eventually, we will want to deal with the full complexity…" (von Fintel and Heim 2010, p. 66) and look at worlds and times. For now, we will just look at times, as we did for worlds before. We will introduce a new basic type for times, $\langle i \rangle$.

(1) Semantic Types
   a. $\langle e \rangle$, $\langle t \rangle$, and $\langle i \rangle$.
   b. If σ and τ are types, then $\langle \sigma, \tau \rangle$ is a type.
      Nothing else is a type.

(2) Semantic Denotation Domains
   $\langle e \rangle$ (for individuals), $\langle t \rangle$ (for truth values),
   $\langle i \rangle$ (for time intervals).

"For doing semantics it is not necessary to say precisely what times are."
(von Stechow 2009, p. 3)

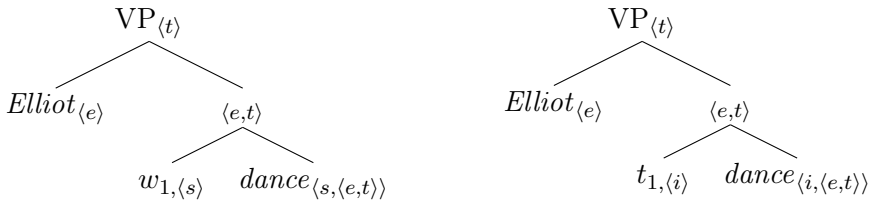
(3) a. *Elliot must dance.*
   b. *Elliot danced.*

(4) $[\![\textit{dance}]\!]^g = \lambda w \in D_{\langle s \rangle}.\ \lambda x \in D_{\langle e \rangle}.\ x$ dances in w (type $\langle s, \langle e, t \rangle \rangle$)

(5) $[\![\textit{dance}]\!]^g = \lambda t \in D_{\langle i \rangle}.\ \lambda x \in D_{\langle e \rangle}.\ x$ dances at t (type $\langle i, \langle e, t \rangle \rangle$)

"…what are assumed to be one-place predicates such as intransitive verbs are analyzed as two-place predicates, taking an individual argument and a time argument." (Kusumoto 2005, p. 318)

(6)



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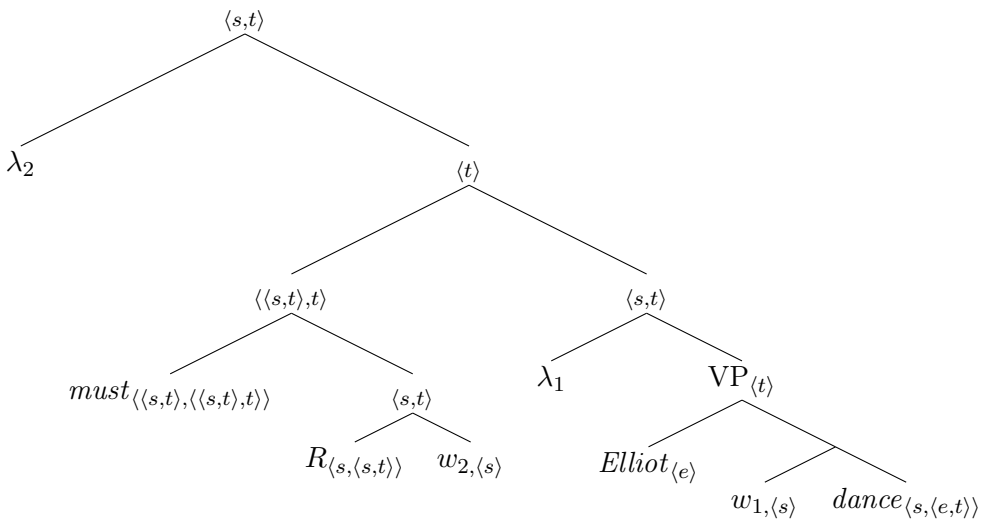

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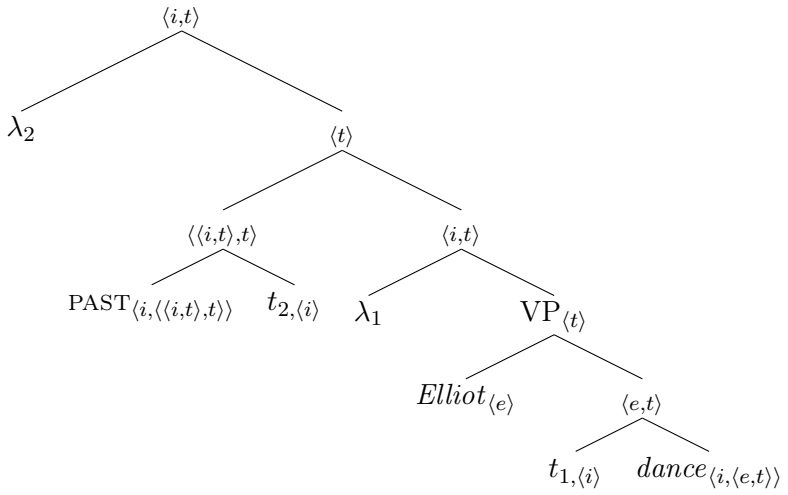


(9) $[\![\text{PAST}]\!]^g = \lambda t \in D_{\langle t \rangle}.\ \lambda P \in D_{\langle i,t \rangle}.\ \exists t' [t' < t\ \&\ P(t') = 1]$

"Semantic tenses are covert, i.e. they are not pronounced." (von Stechow 2009, p. 12)

> "All occurrences of what we see as the past tense morphology in English are semantically vacuous. They do not carry the meaning of anteriority at all. What carries the meaning of anteriority is a phonetically null element in English. There is a licensing condition on occurrences of the past tense morphology. Every occurrence of past tense morphology has to be licensed by the phonetically null element by being c-commanded by it." (Kusumoto 2005, p. 334)

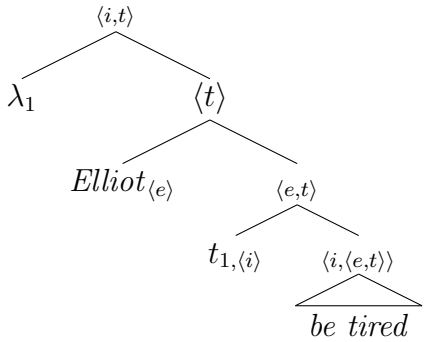
(10) $[\![\textit{Elliot danced}]\!]^g(t*) = 1$ iff $\exists t' [t' < t*\ \&$ Elliot dances at $t']$,
where $t*$ is the time of utterance

(11) $[\![\text{PRES}]\!]^g = \lambda t \in D_{\langle t \rangle}.\ \lambda P \in D_{\langle i,t \rangle}.\ P(t) = 1$

An alternative to the lexical entry in (11) above is to assume that there is no such thing as a PRES-operator (cf. also Heim 1997, p. 19). The two alternatives are sketched below.

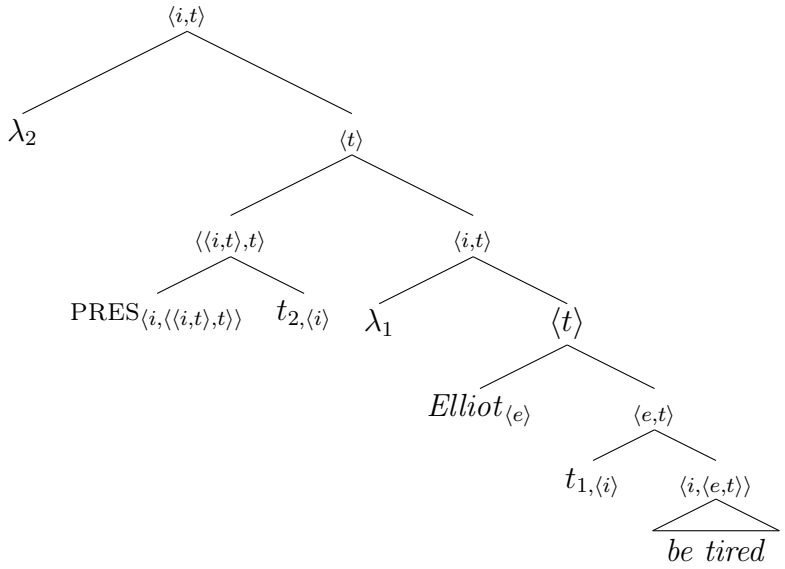
(12) *Elliot is tired.*

(13) a.



b. $[\![\, \textit{Elliot is tired} \,]\!]^g(t*) = 1$ iff Elliot is tired at $t*$

(14) a.



b. $[\![\, \textit{Elliot is tired} \,]\!]^g(t*) = 1$ iff Elliot is tired at $t*$

(15) $[\![\, \text{FUT} \,]\!]^g = \lambda t \in D_{\langle t \rangle}.\ \lambda P \in D_{\langle i,t \rangle}.\ \exists t' \, [t' > t \ \&\ P(t') = 1]$

There is, of course, considerably more to be said about the semantics of the above operator.

3 Temporal Adverbs and Prepositional Phrases

Let us briefly consider the contribution of temporal adverbs and Prepositional Phrases such as *on my birthday* and *yesterday*, e. g. (16).

(16) a. *Mary called on my birthday.*
b. *Mary called yesterday.*

"The simplest account of these temporal adverbials and Prepositional Phrases has them of type $\langle i, t\rangle$." (von Stechow 2009, p. 18). We will take up this suggestion. Below is the interpretation of the Prepositional Phrase *on my birthday*. The Preposition has the lexical entry in (18).

(17) $[\![\, on\ my\ birthday \,]\!]^g = \lambda t_{\langle i\rangle}.\ t$ is on my birthday

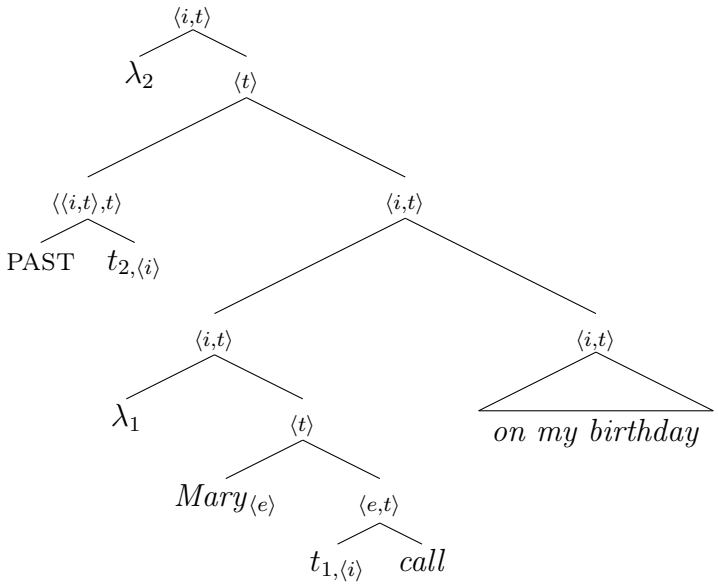
(18) $[\![\, on \,]\!]^g = \lambda t.\ \lambda t'.\ t' \subseteq t$

Can you think of a lexical entry for the preposition *at*?

(19) $[\![\, at \,]\!]^g = \lambda t.\ \lambda t'.\ t' = t$

Our sentence in (16-a) then has the following Logical Form:

(20)



(21) $[\![\, Mary\ called\ on\ my\ birthday. \,]\!]^g(t*) = 1$
iff $\exists t' [t' < t*$ & $t' \subseteq$ my birthday & Mary calls at $t']$

These prepositions need not be overt, i.e. von Stechow (2009, p. 18) treats adverbs such as *yesterday* as in (22) below.

(22) a. $[\![\, yesterday \,]\!]^g =$ the day before the day that contains $t*$ (type $\langle i\rangle$)
b. $[\![\, on\ yesterday \,]\!]^g = \lambda t_{\langle i\rangle}.$ the day before the day that contains $t* \subseteq t$
(von Stechow 2009, p. 18, ex. (41))

You might have noticed that above, we treated *my birthday* as being of type $\langle i\rangle$. It might seem to you to be of type $\langle e\rangle$, however. Here is one way of dealing with this worry (cf. also Romero and von Stechow 2009, pp. 21-22 for discussion): Temporal prepositions are ambiguous. Each preposition has a variant of type $\langle i, \langle i, t\rangle\rangle$ and a variant of type $\langle e, \langle i, t\rangle\rangle$.

(23) a. $[\![on]\!]^g = \lambda t_{\langle i \rangle}.\ \lambda t'_{\langle i \rangle}.\ t'_{\langle i \rangle} \subseteq t$ (type $\langle i, \langle i, t \rangle \rangle$)
b. $[\![on]\!]^g = \lambda x_{\langle e \rangle}.\ \lambda t'_{\langle i \rangle}.\ t' \subseteq \tau(x)$,
where $\tau(x)$ is the time of x

The function τ is a type shifter from individuals to times. Only individuals that uniquely determine a time can be objects of *on*.

4 The Partee Problem

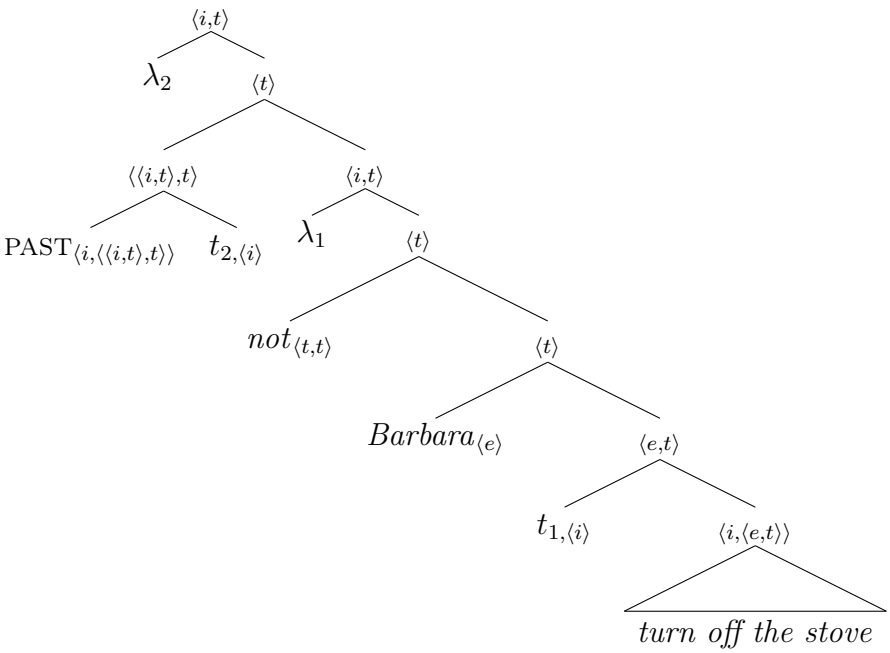
The semantics of PAST we just introduced treats it as an existential quantifier over times, just as we treated possibility modals were treated as existential quantifiers over accessible worlds. This seems quite adequate for examples like (24), as von Fintel and Heim (2010, p. 71) remark:

(24) a. *John went to a private school.*
b. $[\![$ *John went to a private school.* $]\!]^g(t*) = 1$ iff
$\exists t' [t' < t*$ & John goes to a private school at $t']$

What about the example in (25), however? Let us take a look at the interpretations our semantics assigns to the example.

(25) *I didn't turn off the stove.*
(Partee 1973, 602, ex. (3))

(26) a.



b. $[\![$ *Barbara didn't turn off the stove.* $]\!]^g(t*) = 1$
iff $\exists t' [t' < t*$ & it is not the case that Barbara turned off the stove at $t']$

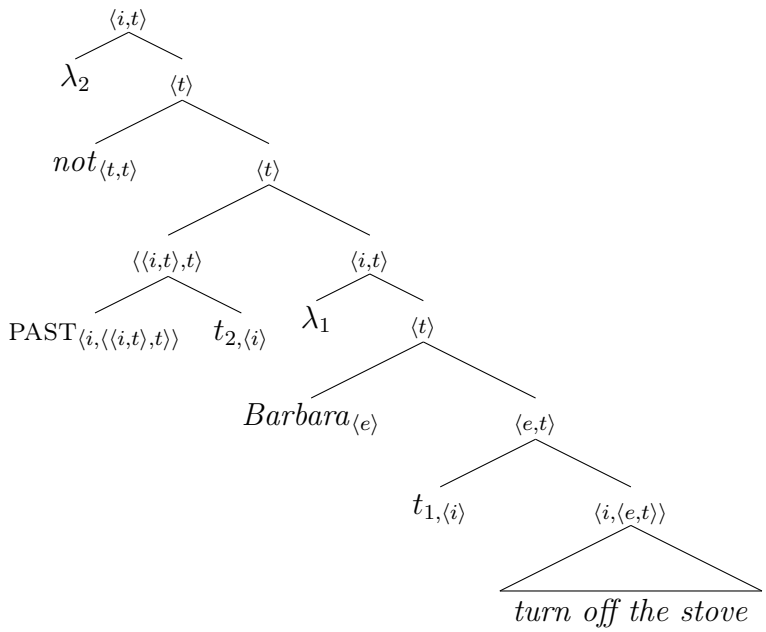
The truth conditions of the Logical Form in (26-a) can be paraphrased as: "There is some time in the past at which I did not turn off the stove." This is too weak!

We might try to give the negation scope over the tense operator, as in (27-a). The sentence will then be true iff there is no time in the past at which I turned off the stove. This is too strong! Partee (1973, pp. 602-603) remarks:

> "When uttered, for instance, halfway down the turnpike, such a sentence clearly does not mean either that there exists some time in the past at which I did not turn off the stove or that there exists no time in the past at which I turned off the stove. The sentence clearly refers to a particular time – not a particular instant, most likely, but a definite interval whose identity is generally clear from the extra-linguistic context,..."

We will not develop Partee's analysis in detail. If you're interested, take a look at Partee (1973) and Kratzer (1998), and at the discussion in von Stechow (2009, pp. 20-23).

(27) a.



b. $[\![$ *Barbara didn't turn off the stove.* $]\!]^g(t*) = 1$
iff it is not the case that $\exists t' [t' < t*$ & Barbara turned off the stove at $t']$

Instead, we will pursue a suggestion by Robert Stalnaker, and allow the existential quantifier over times to be contextually restricted to times in the salient interval of Barbara leaving her house. "Since natural language quantifiers are typically subject to contextual restrictions, this is not a problematic assumption." (von Fintel and Heim 2010, pp. 72-73). A revised lexical entry would then look as follows:

(28) $[\![\text{PAST}]\!]^g = \lambda C_{\langle i,t\rangle}.\ \lambda t_{\langle i\rangle}.\ \lambda P_{\langle i,t\rangle}.\ \exists t' [C(t')\ \&\ t' < t*\ \&\ P(t')]$

Exercise 4.1:
Assuming the revised lexical entry for PAST above and the variable assignment below

$$g(C) = \{t'' : t'' \subseteq [9.15\,\text{a.m.}, 10.50\,\text{a.m.}]\},$$

which of the Logical Forms above correctly captures the meaning of (25)? Show this by compositionally interpreting the Logical Form in question.

5 Subordinate Tense

"A touchstone for the adequacy of the semantics for tense is the behavior of tenses in subordinate constructions." (von Stechow 2009, p. 23) For this reason, we're next going to take a look at how tense behaves in complement, relative, and participle clauses, and then see how our present semantics copes with what we have found.

Tense in Complement Clauses. It has been observed that examples such as (29), (30), and (31) are ambiguous.

(29) *John said that Mary was pregnant.*
   a. John said: "Mary is pregnant." (SIMULTANEOUS)
   b. John said: "Mary was pregnant." (SHIFTED)
   (Menéndez-Benito 2008, class 3, p. 1, ex. (2))

(30) *John believed that Mary was sick.*
   a. John believed: "Mary is sick." (SIMULTANEOUS)
   b. John believed: "Mary was sick." (SHIFTED)
   (Romero and von Stechow 2009, p. 4-5, ex. (14))

(31) *John concluded that Mary owned an SUV.*
   a. John concluded: "Mary owns an SUV."
   b. John concluded: "Mary owned an SUV."
   (Menéndez-Benito 2008, class 2, p. 4, ex. (20))

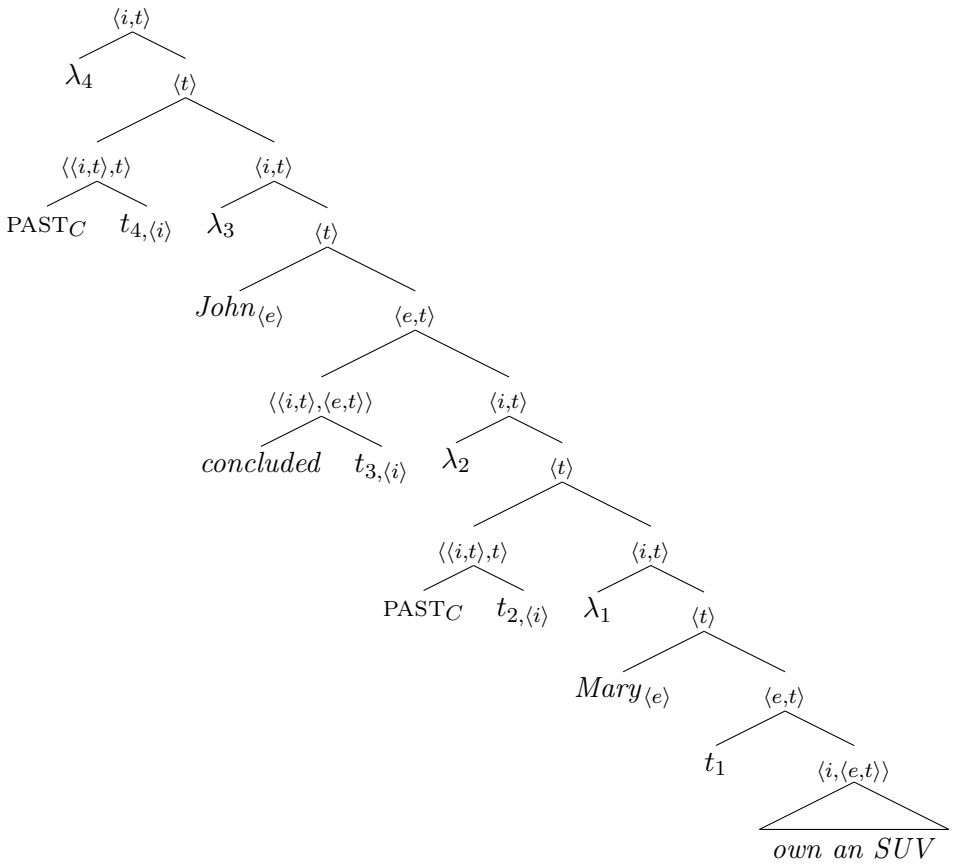
Let us explore whether our current system can account for this ambiguity. To further postpone introducing worlds back into our semantics, let us assume the simplified lexical entry in (32) for *conclude*.

(32) $[\![\, \textit{conclude} \,]\!]^g = \lambda t_{\langle i \rangle}.\ \lambda P_{\langle i,t \rangle}.\ \lambda x_{\langle i \rangle}.\ x$ draws a conclusion at t, and if this conclusion is correct, then $P(t)$ (type $\langle i\langle\langle i,t\rangle,\langle e,t\rangle\rangle\rangle$)
   (Menéndez-Benito 2008, class 6, p. 2, ex. (11))

One Logical Form for (31) is in (33). Which of the two readings discussed above does this Logical Form correspond to?

Exercise 5.1:
Compositionally interpret the Logical Form in (33) below.

(33)



(34) $[\![$ *John concluded that Mary owned an SUV* $]\!]^g(t*) = 1$ iff
$\exists t' [t' < t*$ & John draws a conclusion at t' and if this conclusion is correct, then $\exists t'' [t'' < t'$ & Mary owns an SUV at $t'']$

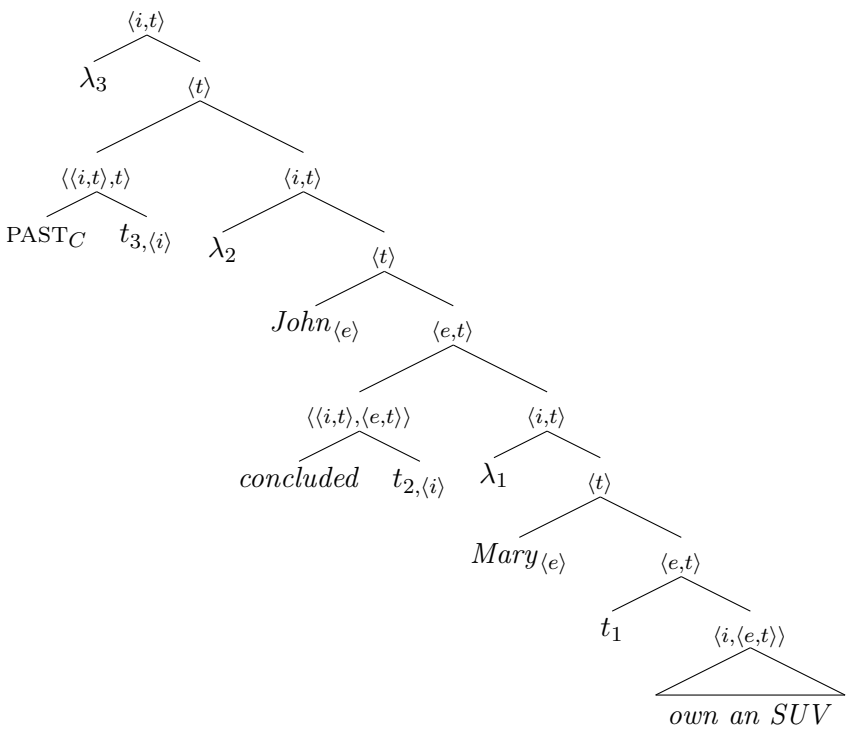
Can you think of a Logical Form that would give us the other reading for the sentence?

Recall from above that semantic past tense is an operator licensing tense morphology on the verb. Kusumoto (1999, 2005) suggest that in (31), for instance, past tense morphology in the complement clause can also be licensed by semantic past tense in the matrix clause, resulting in the Logical Form in (36): "Roughly speaking, the ambiguity of sentences like the following is attributed to whether the embedded clauses contain the past tense operator (i.e. PAST) or not." (Kusumoto 1999, ch. 2, p. 86)

(35) $[\![$ *John concluded that Mary owned an SUV* $]\!]^g(t*) = 1$ iff
$\exists t' [t' < t*$ & John draws a conclusion at t'
and if this conclusion is correct, then Mary owns an SUV at $t']$

The structure in (36) will give us the simultaneous reading. Its interpretation is in (35) above. So far, so good, then.

(36)



A Puzzle. Let us look at another type of examples, with present embedded under past tense. As a note of caution: The above sentences are marked for some speakers.

(37) Context: We are wondering why John isn't here.
I talked to him this morning, and...

a. *...he said that he has the flu.*
b. *...and he said that he has a hangover.*

(Heim 1997, p. 28, ex. (1)-(4))

(38) *John believed that Mary is sick.*
(Romero and von Stechow 2009, p. 5, ex. (15))

The sentence in (38) for instance can be paraphrased as Mary was sick at the time when John believed her to be so, and she is still sick at the time of utterance. This has been called the DOUBLE-ACCESS reading. See Kusumoto (1999, ch. 2, p. 100 ff.) for discussion and references.

Tense in Relative Clauses. Let us next consider what happens in relative clauses. Consider the example in (39) from Kiyomi Kusumoto's dissertation.

(39) *Eva talked to the boy who was crying.*

She observes (as have others) that the sentence is in principle compatible with any of the three situations below:

1. Eva talked to the boy who was crying at t,
   where t is at the time of her talking to him. (SIMULTANEOUS)

2. Eva talked to the boy who was crying at t,
   where t is before her talking to him. (BACKWARD-SHIFTED)

3. Eva talked to the boy who was crying at t,
   where t is after her talking to him. (LATER-THAN-MATRIX)

In case you have difficulties getting the LATER-THAN-MATRIX interpretation for the relative clause, below are more examples.

(40) a. (*On my wedding day,*) *my mother gave me the ring which I gave to my daughter* (*on her wedding day*).
b. *Hillary married a man who became the president of the United States.*
c. *Who hired the person who wrote this article?*
(Kusumoto 1999, p. 82, ex. (56))

We have already come across the SIMULTANEOUS and the BACKWARD-SHIFTED reading when discussing tense in complement clauses. So far, we haven't encountered the LATER-THAN-MATRIX interpretation. Notice that (41), for instance, repeated from above, does not allow for such an interpretation.

(41) *John concluded that Mary owned an SUV.*

	Backward Shifted	Simultaneous	Later than Matrix
Relative Clauses	☑	☑	☑
Clausal Complements	☑	☑	☒

Figure 1: Interpretations of Past-under-Past in Relative and Complement Clauses

EXERCISE 5.2:
Go back to the example in (41). Do we correctly predict the unavailability of the LATER-THAN-MATRIX interpretation?

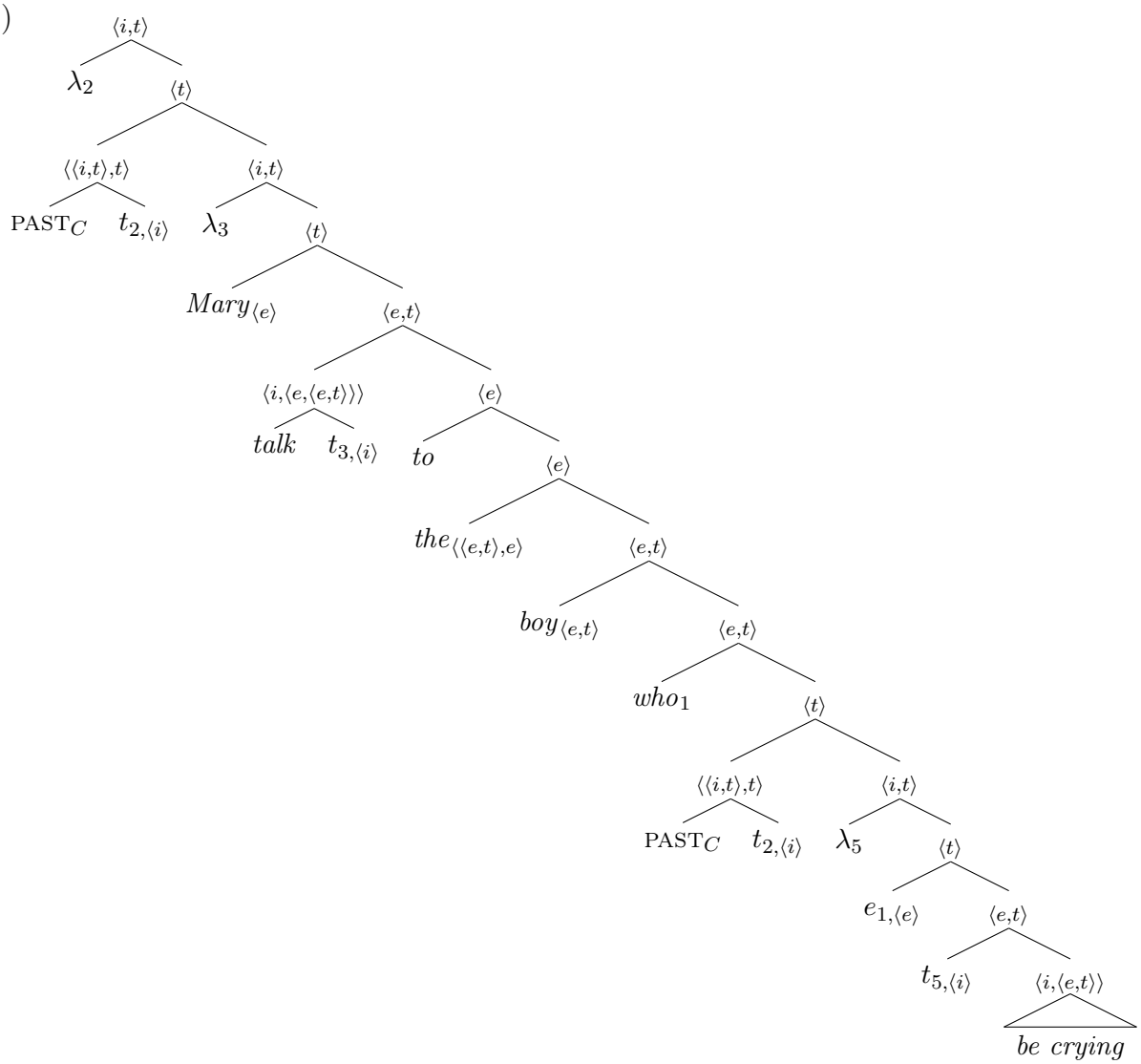
Let us take a closer look at the example in (40-b), and at possible Logical Forms we could assign to it. One suggestion is in (43) on the next page. Its interpretation is below.

(42) $[\![$ *Mary talked to the boy who was crying* $]\!]^g(t*) = 1$ iff
$\exists t''\,[t'' < t* \;\&$ Mary talkes at t'' to the unique x such that x is a boy $\&$
$\exists t'\,[t' < t* \;\&\; x$ is crying at $t']]$

"As a result, the event time of the matrix predicate and that of the embedded predicate are ordered only with respect to the speech time (namely, they have to precede the speech time) but not with respect to each other. Thus, any order between the two is allowed, predicting that the earlier-than-matrix, simultaneous, and later-than-matrix interpretations are all available." (Kusumoto 1999, ch. 2, p. 92)

Alternatively, we might consider the Logical Form in (45) on page 13, with no past-tense operator in the relative clause. In (45), the time variable that is an object to the lower past-tense operator has the same index as the time variable that is an object of the higher past-tense operator.

(43)



Exercise 5.3:
Consider a variant of the Logical Form in (43) above, sketched below.

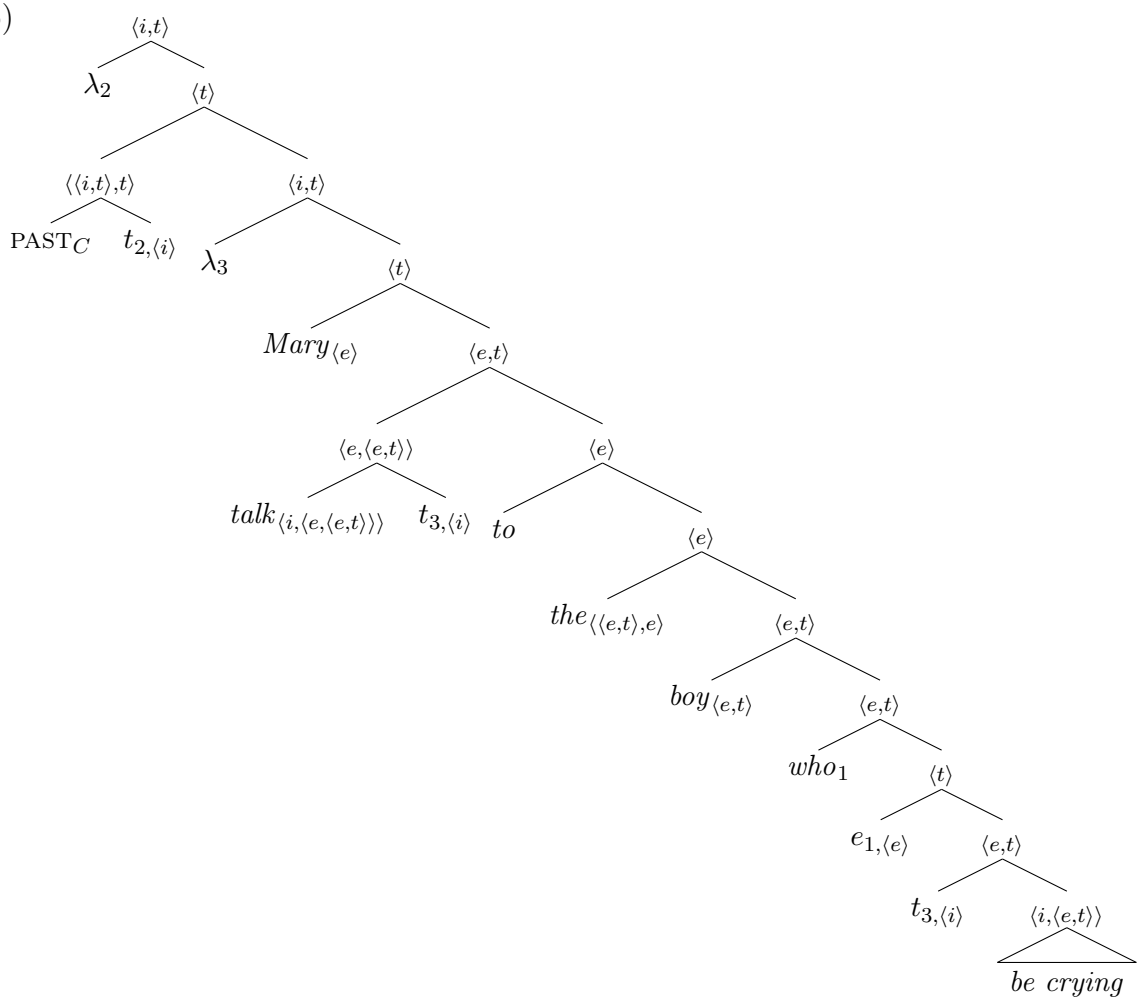
$$[\, who_1 \,[\,[\,\text{PAST}\ t_{3,\langle i\rangle}\,]\,[\lambda_5\,[\,e_{1,\langle e\rangle}\,[\,t_{5,\langle i\rangle}\ \textit{be crying}\,]\,]\,]\,]\,]$$

Which interpretation would this Logical Form receive?

(44) $[\![$ *Mary talked to the boy who was crying* $]\!]^g(t*) = 1$ iff
$\exists t''\,[t'' < t*$ & Mary talkes at t'' to the unique x such that x is a boy &
$\exists t'\,[t' < t''$ & x is crying at $t']]$

Exercise 5.4:
Compositionally interpret the Logical Form in (45).
Which reading of the sentence does it correspond to?

(45)



The Logical Form in (45) will give us the simultaneous reading:

(46) $[\![$ *Mary talked to the boy who was crying* $]\!]^g(t*) = 1$
iff $\exists t'\,[t' < t*$ & Mary talkes at t' to the unique x
such that x is a boy & x is crying at $t']$

To sum up: "Although a vacuous past tense is licensed in the same manner both in relative clauses and clausal complements, the analysis implies that its interpretation differs in the two types of clauses. In relative clauses, a vacuous tense is directly bound by

a higher tense operator while in clausal complements, it is bound by a lambda operator." (Kusumoto 1999, ch. 2, p. 91)

Tense in Participle Clauses. Compared to (42) above, the sentence in (47) only has a simultaneous interpretation. A summary of the available interpretations for the constructions discussed so far is provided in Table 2 on the next page.

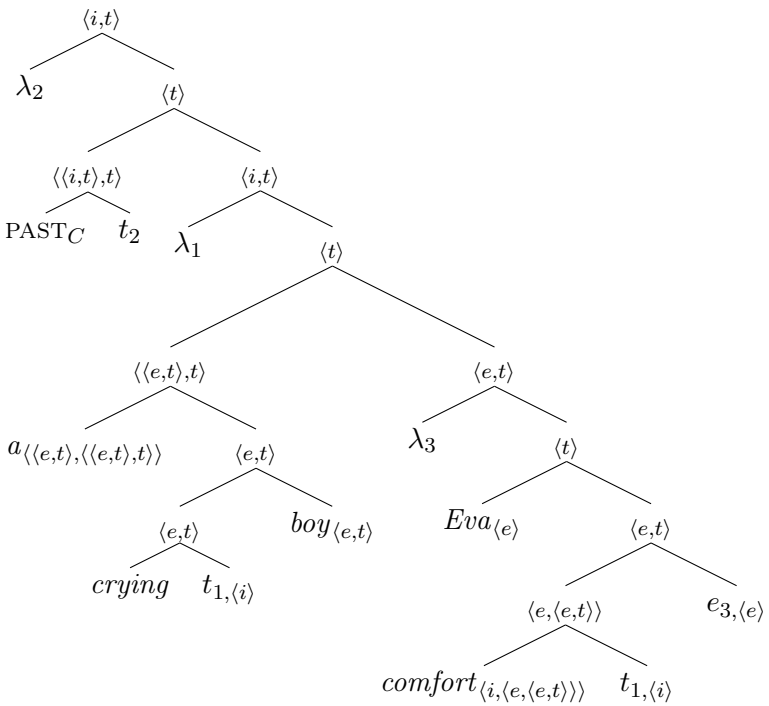
(47) *Eva comforted a crying boy.*

	Backward Shifted	Simultaneous	Later than Matrix
Relative Clauses	☑	☑	☑
Participle Clauses	☒	☑	☒
Clausal Complements	☑	☑	☒

Figure 2: Subordinate Tense: Available Interpretations

A Logical Form for the sentence is in (48) below. Both, the time argument of the verb and the time argument of the participle are bound by the same lambda binder, resulting in the interpretation in (49), the desired simultaneous interpretation of the sentence.

(48)

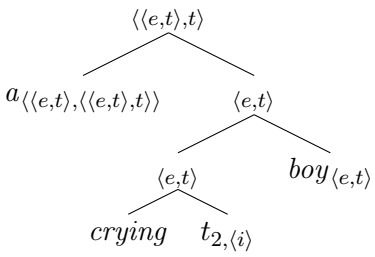


(49) $[\![\, \textit{Mary comforted a crying boy} \,]\!]^g(t*) = 1$
iff $\exists t' \, [t' < t* \;\&\; \exists x \, [x$ is a boy $\&$ x is crying at t' $\&$ Mary talks to x at $t']]$

This is not the only Logical Form we can assign to the sentence, however. In our system, there is nothing that keeps us from assigning the sentence the Logical Form sketched

below, for instance. In (50), the time argument of the participle will be bound by the highest lambda operator.

(50)



The sentence would then be true if the boy in question is crying at the time of utterance, cf. (52). A later-than-matrix interpretation of the sentence is however unavailable.

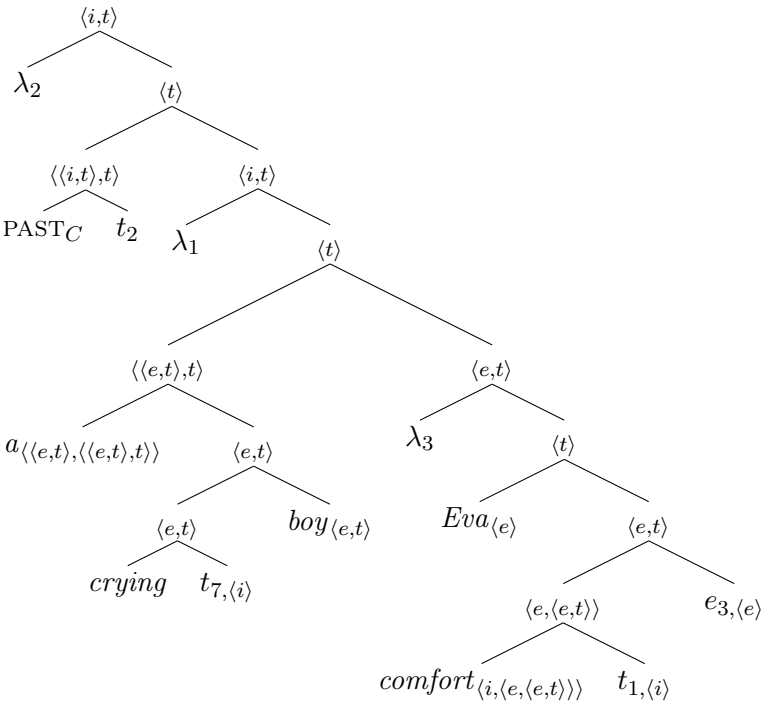
(51) $[\![\, \textit{Mary comforted a crying boy} \,]\!]^g(t*) = 1$
iff $\exists t' \, [t' < t* \;\&\; \exists x \, [x$ is a boy $\&\; x$ is crying at $t' \;\&$ Mary talks to x at $t*]]$

In order for such a structure to be excluded, we'd have to stipulate that a time argument has to be bound by the nearest lambda operator. (So, here's one conclusion: We really do need a binding theory for times!)

As long as we allow for free time variables, yet another Logical Form for the sentence could look like (53). There, the time argument of the participle is free, resulting in the truth conditions below.

(52) $[\![\, \textit{Mary comforted a crying boy} \,]\!]^g(t*) = 1$
iff $\exists t' \, [t' < t* \;\&\; \exists x \, [x$ is a boy $\&\; x$ is crying at $g(7) \;\&$ Mary is comforting x at $t']]$

(53)



Depending on the variable assignment, we'd additionally predict a backward-shifted reading of the sentence to be available. This is not the case.

Not all is lost, however. We will come back to participle clauses and their temporal interpretation shortly. Before we do so, we will consider the temporal interpretation of nouns and determiners. Why? Consider the sentence in (54), with the definite determiner. For the sentence, a backward-shifted interpretation of the participle clause is also available. (Maybe even a forward-shifted interpretation?)

(54) *Eva talked to the crying boy.*

6 The Temporal Interpretation of Noun Phrases

The former pile of bricks collapsed into a future wall.
(Musan 1995, p. 141, attributed to Mürvet Enç)

The choice of determiner seems to make a difference for the temporal interpretation of the Noun Phrase, e.g. (55-a) has a non-contradictory reading, while (55-b) has not.

(55) a. *Every fugitive is in jail.*
b. #*There is a fugitive in jail.*
(Musan 1995, p. 11, ex. (1), slightly modified)

Here is a first shot at a generalisation:

(56) A noun phrase can be temporally independent
if and only if it is presuppositional.

Exercise 6.1:
Pick five determiners of your choice. For those, try to come up with examples that either favor a temporally independent interpretation of the Noun Phrase, or turn out contradictory when the Noun Phrase receives a temporally dependent interpretation.

Below are some more examples from the literature.

(57) a. *Every family member of Mary' graduated from UMass Amherst.*
(Kusumoto 1999, ch. 2, p. 188, ex. (87))
b. *Every cheerleader is now a stay-at-home mom.*
(Menéndez-Benito 2008, class 8, p. 1, ex. (11))
c. *John will meet every hostage at the president's party.*
(Enç 1981, p. 81)
d. *In 1963, my father biked through all of France by himself.*
(Tonhauser 2002, p. 9, ex. (13))
e. *All the tadpoles are now frogs.*
(Menéndez-Benito 2008, class 8, p. 1, ex. (10))

A first step towards a solution will be, as you have already suggested in class at earlier points, to provide all predicates with a time argument, e.g. *fugitive* would then have the lexical entry below.

(58) $[\![\textit{fugitive}]\!]^g = \lambda t \in D_{\langle i \rangle}.\ \lambda x \in D_{\langle e \rangle}.\ x$ is a fugitive at t (type $\langle i, \langle e, t \rangle \rangle$)

A key element of the proposal in Kusumoto (1999, 2005) is that, although predicates other than verbs have a time argument slot, the time argument is not saturated in the syntax: "On the one hand, the time argument slot of the tensed predicate *dance* is saturated by the tense morpheme $past_2$ in the object language. That is, whatever the value of $past_2$, it denotes the time of dancing. On the other hand, the time argument slot of the noun *man* is not saturated in the object language; its interpretation is determined in the meta language." (Kusumoto 2005, pp. 339-340)

Musan (1995) proposes that presuppositional determiners such as *the* and *every* introduce existential quantification over times, thereby binding the temporal variable introduced by the noun. In contrast, the determiner *a* for instance does not introduce existential quantification over times, cf. (60). "As a result, the time argument slot of the noun is bound by the tense in the same sentence. On the other hand, the time argument slot of a noun in an NP with a presuppositional determiner is bound by an existential quantifier introduced by the determiner itself. Thus, it can be temporally independent of the tense in the sentence it occurs." (Kusumoto 1999, ch. 2, p. 130)

(59) $[\![\textit{every}]\!]^g = \lambda P \in D_{\langle i,\langle e,t\rangle\rangle}.\ \lambda Q \in D_{\langle i,\langle e,t\rangle\rangle}.\ \lambda t \in D_{\langle i\rangle}.\ \forall x\,[\exists t'\,[P(t')(x)] \rightarrow Q(t)(x)]$

(60) $[\![a]\!]^g = \lambda P \in D_{\langle i,\langle e,t\rangle\rangle}.\ \lambda Q \in D_{\langle i,\langle e,t\rangle\rangle}.\ \lambda t \in D_{\langle i\rangle}.\ \exists x\,[P(t)(x)\ \&\ Q(t)(x)]$

For the determiners that can have both presuppositional and non-presuppositional readings (e.g. English *some*), we have to assume two – systematically related – lexical entries.

Exercise 6.2:
Is it possible to systematically related $some_1$ with the lexical entry in (60) to $some_2$, which introduces existential quantification over times?

We are not quite there yet, as we can see when looking at the interpretation of a simplified version of (61), for instance. The structure in (64) on the next page is not interpretable, however. The sister of *every hostage* is of type $\langle e, t \rangle$, whereas the second argument of *every* is required to be of type $\langle i, \langle e, t \rangle \rangle$.

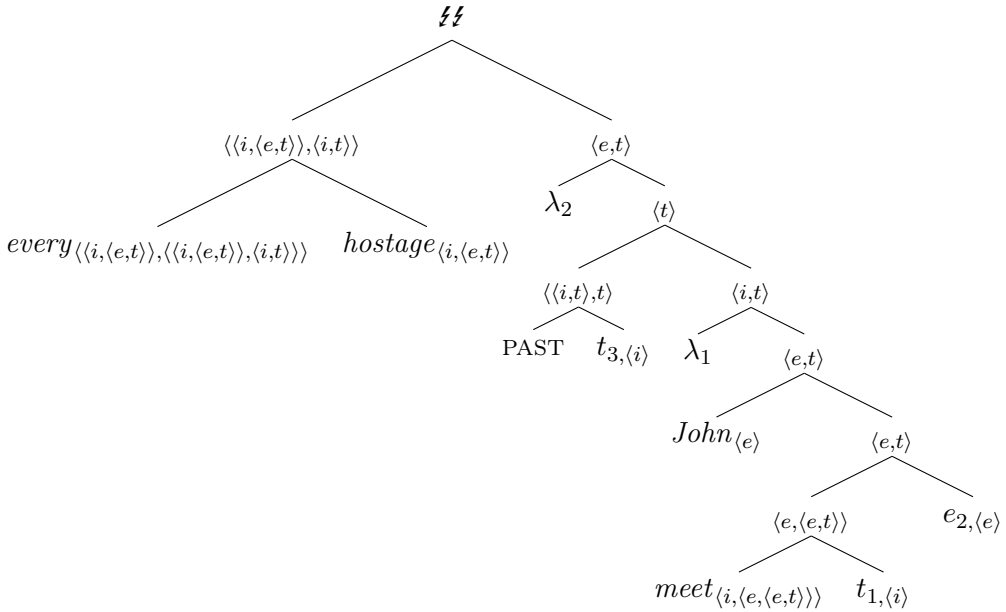
(61) *John met every hostage.*

There are various solutions to this problem. Here is one. Let us assume that determiners are really of type $\langle \langle e, \langle i, t \rangle \rangle, \langle \langle e, \langle i, t \rangle \rangle, \langle i, t \rangle \rangle \rangle$, i.e. their first two arguments are of type $\langle e, \langle i, t \rangle \rangle$, rather than of type $\langle i, \langle e, t \rangle \rangle$. We will assume from now on that the time argument is the outermost argument of any predicate, e.g. *hostage* has the lexical entry in (62), and that semantic past tense is interpreted as in (63).

(62) $[\![\, \textit{hostage} \,]\!] = \lambda x \in D_{\langle e \rangle}.\, \lambda t \in D_{\langle i \rangle}.\; x$ is a hostage at t (type $\langle e, \langle i, t \rangle \rangle$)

(63) $[\![\, \textsc{past} \,]\!] = \lambda P \in D_{\langle i,t \rangle}.\, \lambda t \in D_{\langle i \rangle}.\, \exists t' \, [t' < t \;\&\; P(t)]$

(64)

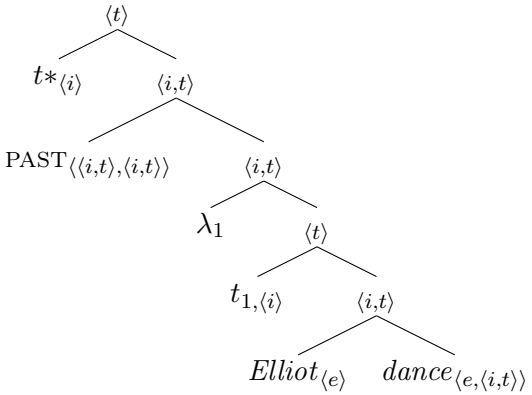


Exercise 6.3:
Can you come with an alternative solution?

The very first sentence we interpreted, repeated from above in (65) will then have the Logical Form below.

(65) *Elliot danced.*

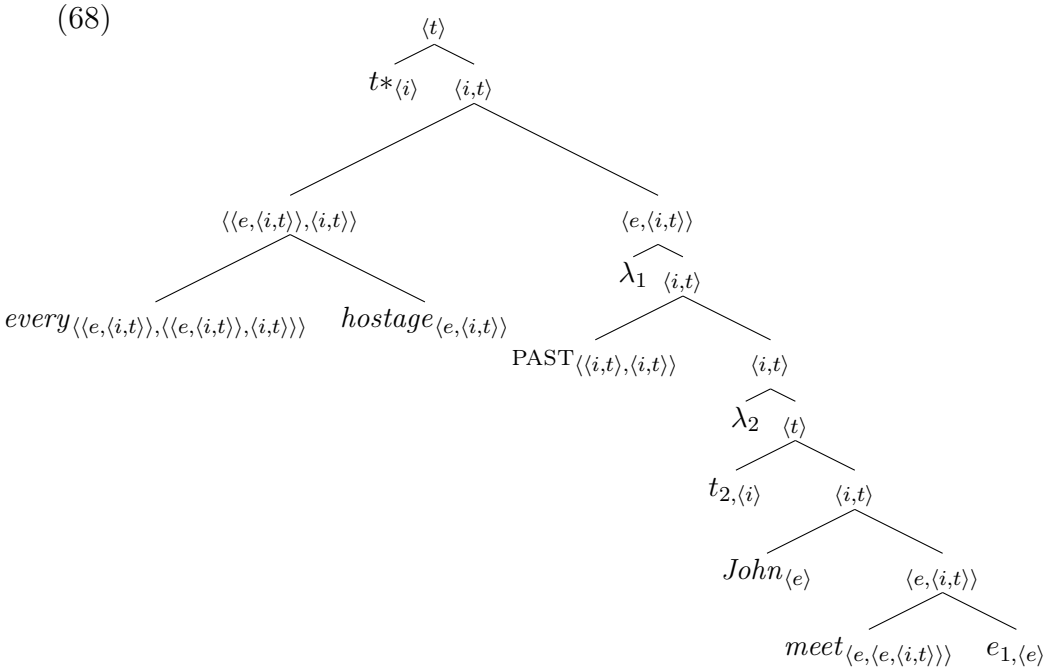
(66)



Let's return to the example in (61) above, and see how this change affects its Logical Form. Let us, for now assume, that the quantified Noun Phrase takes scope over the tense operator. The Logical Form is in (68) on page 18, its interpretation in (67) below.

(67) $[\![\, \textit{John met every hostage.} \,]\!]^g = 1$ iff
$\forall x \, [\exists t' \, [x$ was a hostage at $t'] \rightarrow \exists t'' \, [t'' < t* \;\&$ John met x at $t'']\,]$

(68)



This is what we want, although we might want to contextually restrict the domain of quantification, again: "But surely we don't want quantify over all past, present and future hostages! How exactly do we want to capture context dependency here? Do we need both the quantifier over individuals and the quantifier over times to be contextually restricted?" (Menéndez-Benito 2008, class 9, p. 5)

For completeness sake, let us also consider what happens if the quantified Noun Phrase scope below the tense operator. The Logical Form is in (71) on the next page, and its interpretation in (69) below.

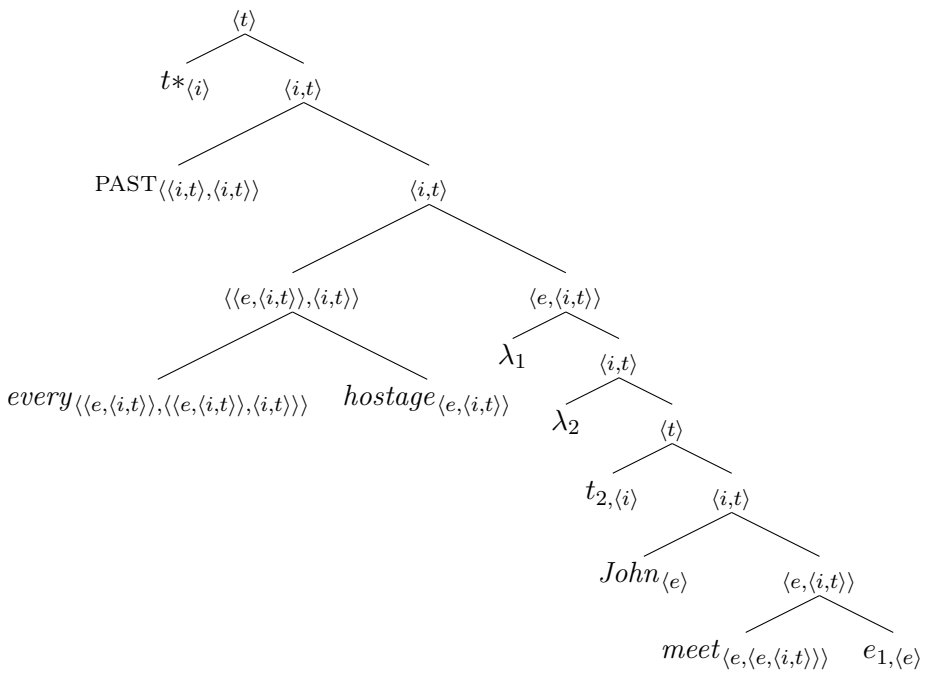
(69) $[\![\, \textit{John met every hostage} \,]\!]^g = 1$ iff
$\exists t'' \, [t'' < t* \; \& \; \forall x \, [\exists t' \, [x \text{ was a hostage at } t'] \rightarrow \text{John met } x \text{ at } t'']\,]$

On this interpretation, John would be required to met simultaneously with every hostage. This might be a problem for examples such as (70) below, attributed to Max J. Cresswell (Heim 1997, p. 13).

(70) *John polished every boot.*

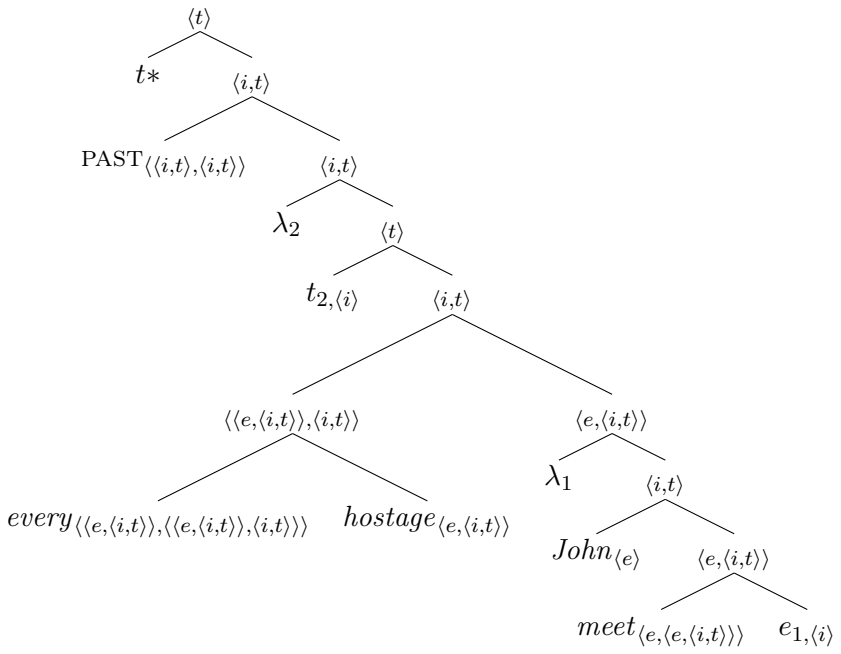
The sentence then can "... only be true if John polished all the boots at exactly the same time. The English sentence does not have a reading which requires this." (Heim 1997, p. 13) Sigrid Beck pointed out in class that we should take aspect into consideration when discussing these examples.

(71)



Note that Kusumoto (2005) even proposes a lower attachment side for the moved quantified Noun Phrase, as in (72) below. Keep this in mind as it will become important later on.

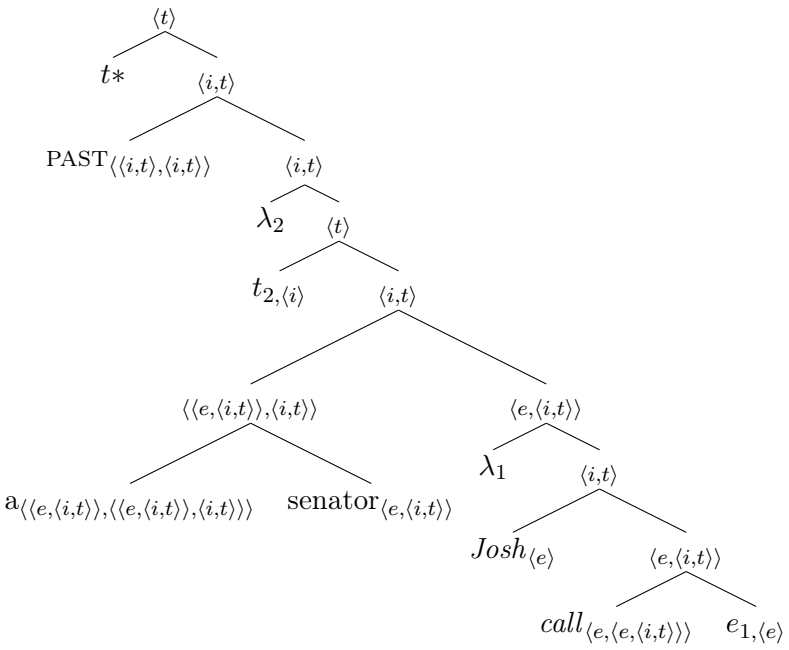
(72)



Let us also look at an example with a weak determiner. The example is in (73), its Logical From is in (74), the interpretation in (75), all on the next page.

(73) *Josh called a senator.*

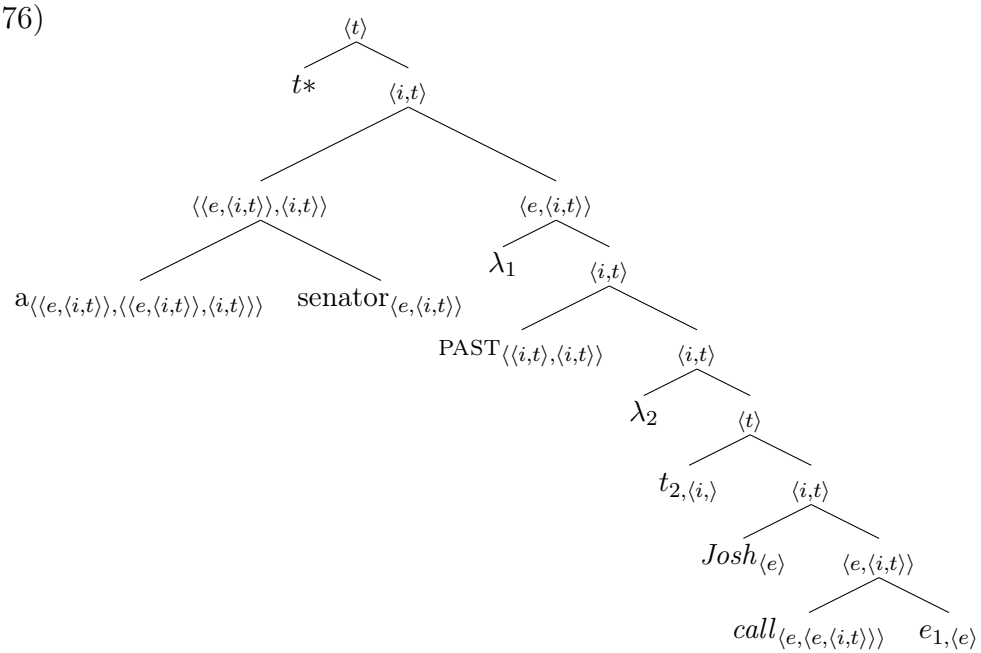
(74)



(75) $[\![$ *Josh called a senator.* $]\!]^g = 1$ iff
$\exists t''\ [t'' < t*\ \&\ \exists x\ [x$ is a senator at t'' & Josh called x at $t'']\,]$

However, nothing keeps us from scoping the quantifier Noun Phrase over the tense operator, as in (76). This has undesired results, as the truth conditions in (77) show.

(76)



(77) $[\![$ *Josh called a senator.* $]\!]^g = 1$ iff
$\exists x\ [x$ is a senator at $t*$ & $\exists t''\ [t'' < t*$ & Josh called x at $t'']\,]$

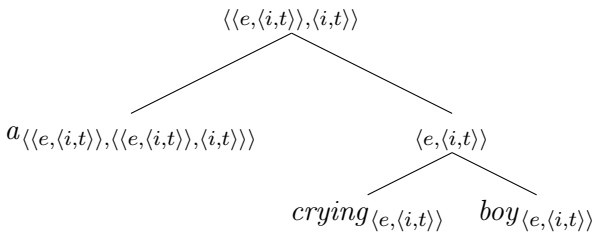
Neither Kusumoto (1999) nor Kusumoto (2005) do comment on this!

Participle Phrases. Let us consider the advantages of the proposal, and return to the temporal interpretation of Participle Phrases.

(78) a. *Mary talked to the crying boy.*
b. *Mary comforted a crying boy.*

"The absence of tense in participle constructions means that the temporal argument of the predicate... is unsaturated." (Kusumoto 2005, p. 350) Both the noun *boy* and the Participle Phrase are of type $\langle e, \langle i, t\rangle\rangle$. They combine via a generalized principle of Predicate Modification.

(79)



(80) Generalized Predicate Modification
If α is a branching node, and β and γ its daughter, and β denotes a function h of type $\langle e, \langle i, t\rangle\rangle$ and γ denotes a function g of type $\langle e, \langle i, t\rangle\rangle$, then α denotes a function f of type $\langle e, \langle i, t\rangle\rangle$, such that for all $x \in D_{\langle e\rangle}$ and all $t \in D_{\langle i\rangle}$, $f(x)(t) = 1$ iff $g(x)(t) = 1$ & $h(x)(t) = 1$.

Thus, the temporal interpretation of the participle (and that of the noun) is not determined at the N' level, and in the case of a weak determiner such as *a* not even at the level of the Noun Phrase.

(81) $\left[\!\left[\begin{array}{c} \diagup\diagdown \\ \textit{crying} \quad \textit{boy} \end{array} \right]\!\right]^g = \lambda x \in D_{\langle e\rangle}.\, \lambda t \in D_{\langle i\rangle}.\, x$ is crying at t & x is a boy at t

(82) $\left[\!\left[\begin{array}{c} \diagup\diagdown \\ a \quad \begin{array}{c} \diagup\diagdown \\ \textit{crying} \quad \textit{boy} \end{array} \end{array} \right]\!\right]^g =$

$\lambda Q \in D_{\langle e,\langle i,t\rangle\rangle}.\, \lambda t \in D_{\langle i\rangle}.\, \exists x\, [x$ is crying at t & x is a boy at t & $Q(x)(t)]$

(83) $\left[\!\left[\begin{array}{c} \diagup\diagdown \\ \textit{every} \quad \begin{array}{c} \diagup\diagdown \\ \textit{crying} \quad \textit{boy} \end{array} \end{array} \right]\!\right]^g =$

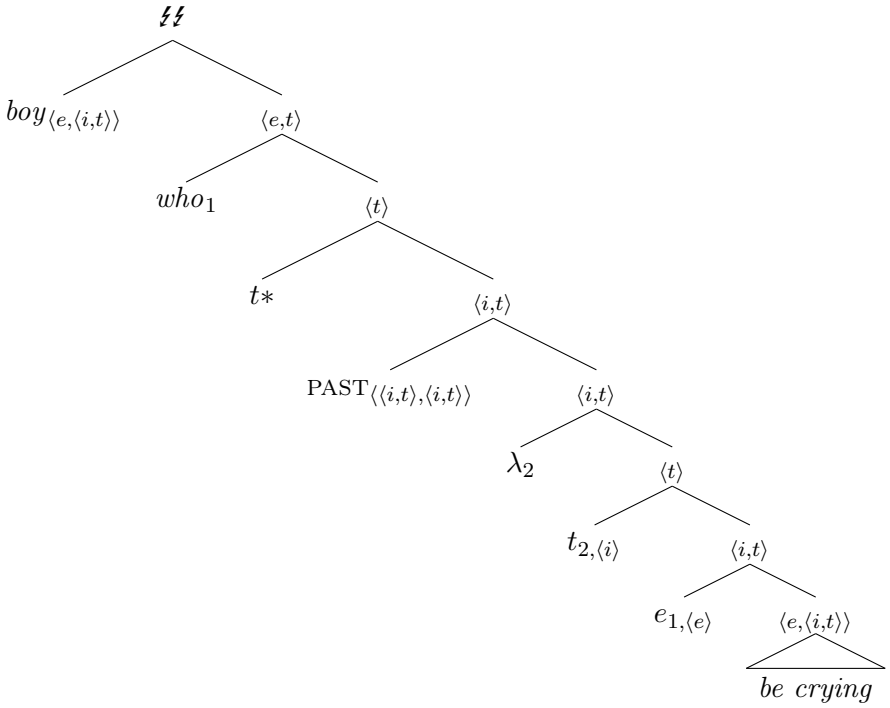
$\lambda Q \in D_{\langle e,\langle i,t\rangle\rangle}.\, \lambda t \in D_{\langle i\rangle}.\, \forall x\, [\exists t'\, [x$ is crying at t' & x is a boy at $t'] \rightarrow Q(x)(t)]\,]$

Relative Clauses. What about Relative Clauses then? "In a relative clause, there is no unsaturated temporal variable. Its temporal interpretation is determined by the past tense inside it. Therefore, the temporal interpretation of the relative clause and that of the noun may be independent of each other. ... On the other hand, the time argument slot of the noun is unsaturated, and thus its temporal interpretation is sensitive to a higher affecting element." (Kusumoto 2005, p. 353) Let us look at an example.

(84) *Mary talked to a boy who was crying.*

We're confronted with a type mismatch when trying to interpreted the structure of the relative clause in (85): The noun *boy* is of type $\langle e, \langle i, t\rangle\rangle$, whereas the relative clause is of type $\langle e, t\rangle$, and we cannot apply Predicate Modification.

(85)

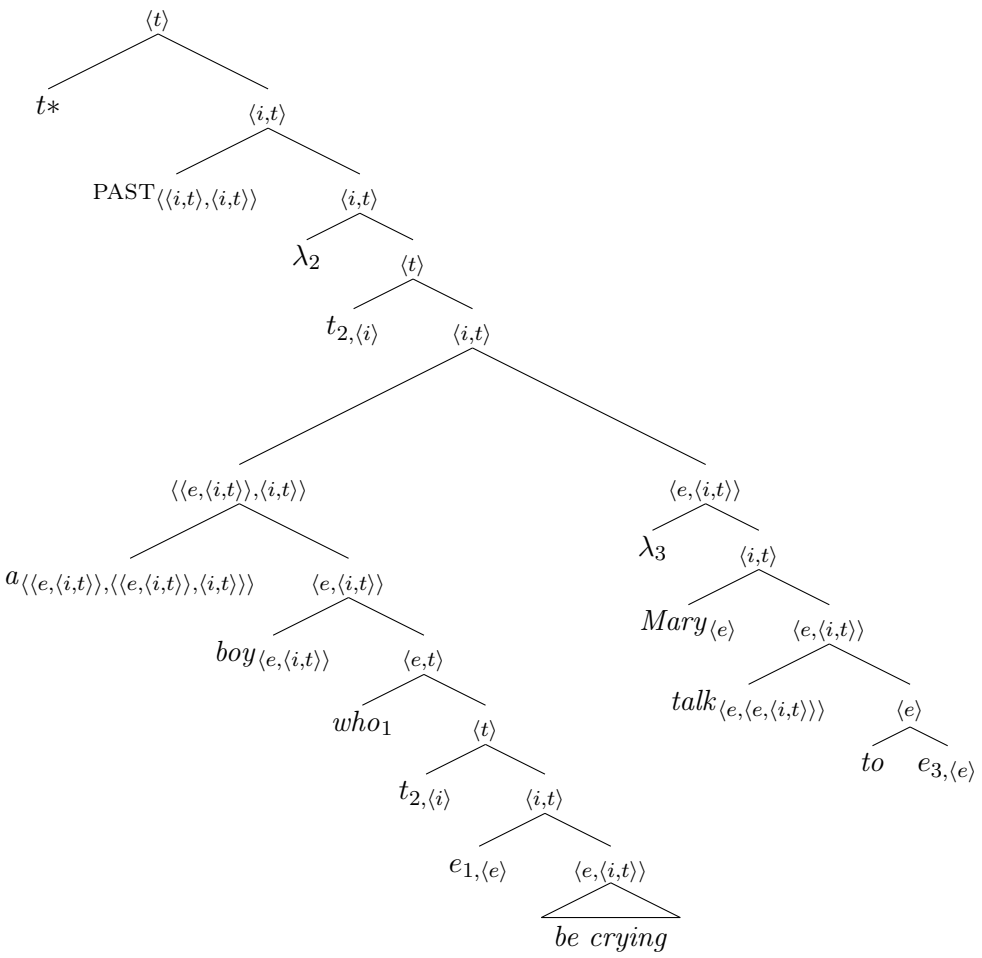


Kusumoto (2005, p. 338, fn. 27) assumes that *boy* combines with the relative clause via the composition principle in (86) below, suggested by Kratzer (1994).

(86) Composition Principle
If α is a branching nod and β and γ its daughters, and β denotes a function f of type $\langle e, \langle i, t\rangle\rangle$, and γ a function g of type $\langle e, t\rangle$, then α denotes a function h of type $\langle e, \langle i, t\rangle\rangle$ such that for all $x \in D_{\langle e\rangle}$ and for all $t \in D_{\langle i\rangle}, h(x)(t) = 1$ & $f(x)(t) = 1$ and $g(x) = 1$.

Exercise 6.4:
Our example in (84) has the Logical Form in (87) on the next page. Compositionally interpret the structure, making use of the new composition principle above.

(87)



6.1 The Temporal Interpretation of Noun Phrases Crosslinguistically: The Case of Guaraní

As a reminder: We have investigated the temporal interpretation of Noun Phrases in English and seen that Noun Phrases may be interpreted temporally independent of the verb. Below is another nice example. On April 12, 2006, a headline on CNN read:

(88) *Dead rapper fired first shot.*
(Tonhauser 2006, p. ,ex. (1))

In her dissertation, Tonhauser (2006) investigates the temporal interpretation of Noun Phrases in Paraguayan Guaraní, a Tupí-Guaraní language mainly spoken in Paraguay, and one of the approximately a dozen languages reported to have overt tense marking on nouns.

Language	Family
Tariana	Arawak
Guaraní	Tupí-Guaraní
Tupinamba	Tupí-Guaraní
Hixkaryana	Carib
Iatê	Macro-Jê
Nambiquara	Nambiquaran
Somali	Cushitic
Potowatomi	Algonquian
Kwakw'ala	Northern Wakashan
Halkomelem	Salish
Jarawara	Arawá
Warí'	Chapakura
Movima	isolate, Bolivia
Mawayana	Arawak

Figure 3: Languages with Nominal Tense (Tonhauser 2006, p. 324, Tab. 9.1)

Her examples come on the one hand from oral narratives, short stories in school books and children's books, and utterances overheard in Paraguay; on the other hand from data collected during elicitation using translation and judgements.

Guaraní has two nominal temporality markers, *-kue* (past) and *–rã̃* (future). Those markers are not obligatory. "... the meanings encoded by the nominal temporality markers are more frequently encoded overtly in Guaran í than in English, where such meanings are only inferred from the discourse context..." (Tonhauser 2006, pp. 314-135)

Kuehe a-hecha pa'i-**kue**-pe.
yesterday A1sg-see priest-KUE-PE
'Yesterday I saw the former priest.'

Ko mbo'e-ha-ra-**rã̃** o-mba.apo heta.
this teach-NOM-AG-RA A3-work much
'This future teacher works a lot.'

Enterove pa'i-**kue** o-ho va'erã reunion-há-pe.
all priest-KUE A3-go VAERA meeting-NOM-PE
'All of the former priests have to go to the meeting.'

Avave doytor-**rã̃** n-oi-pytyvo-i pe h-asỹ-va-pe.
no doctor-RA NEG-A3-help-NEG that 3-sick-RC-PE
'No future doctor helped the sick person.'

"T-a-japi amo guyra ha i-kyra-**kué**-pe ro-mo-ataindý-ne!"
IMP-A1sg-aim.at that bird and 3-fat-KUE-PE 12sg-CAUS1-candle-MIGHT
'I'll focus on that bird and of its fat I'll make you light.'

Figure 4: (Tonhauser 2006, p. 160, ex. (26))

The two suffixes may also co-occur, as is illustrated below.

(89) *Kuehe a-hecha pa'i-rã-ngue-pe.*
yesterday 1sg.-see priest-PAST-FUTURE-DEM.
"Yesterday, I saw the former future priest."
(Tonhauser 2006, p. 164,)

Noun phrases in Guaraní that are not marked with *–kue* or *–rã* "...are temporally interpreted much in the same way as English noun phrases..." (Tonhauser 2006, p. 171)

(90) *A-topa che-rembireko-pe Villarica-pe.*
1sg.-find 1sg.-wife-DEM. Villarica-LOC.
"I met my wife in Villarica."
"When I met her, she was married to an Argentinian."
(Tonhauser 2006, p. 167, ex. (39))

(91) *Pe fugitivo o-ĩme jey carcel-pe.*
DEM. fugitive 3-be again prison-LOC.
"The fugitive is in prison again."
(Tonhauser 2006, p. 168, ex. (40))

Finally, in Guaraní, too, the time at which a noun phrase is interpreted can be provided by a temporal modifier:

(92) *Umi mbo'e-ha-ra agã-gua o-gana-vé umi*
DEM.pl. teach-NOMINAL.-AGENT now-of 3-earn-more DEM.pl.
mbo'e-ha-ra ochenta-gua-gui.
teach-NOMINAL.-AGENT eighty-of-ABL.
"Today's teachers earn more than the teachers of the eighties."
(Tonhauser 2006, p. 169, ex. (41))

Lastly, possessive noun phrases with *-kue* and *-rã* are ambiguous, like their English counterparts with *former* and *future*.[1] Consider the examples in (93) and (94).

(93) *che-róga-kue*
1sg.-house-PAST
"my former house"

The possessive noun phrase above either refers to an entity that is an old house but still in the speakers possession or to an entity that is still a house but not in the speaker's possession anymore. The example below is ambiguous in a similar way.

(94) *che-róga-rã*
1sg.-house-FUTURE
"my future house"
(Tonhauser 2006, p. 156, ex. (25))

[1] The semantics of temporal adjectives in English will be discussed in the next section.

The Nominal Temporality Marker *-kue*. The marker *–kue* conveys that "...the property denoted by the nominal predicate was true at a time in the past.... Relative to a contextually given perspective time, the nominal markers convey that the property denoted by the nominal predicates is not true of the individual(s) denoted by the noun phrase." (Tonhauser 2006, p. 177) The latter property is illustrated below.

(95) *Juan petẽi pa'i-kue.*
Juan one priest-PAST.
"Juan is a former priest."

(96) #...*ha pa'i gueteri.*
and priest still
"...and he's still a priest."
(Tonhauser 2006, p. 177, ex. (3))

Tonhauser (2006, p. 186, ex. (16)) proposes a lexical entry along the lines of (97) below.

(97) $[\![\text{-}kue]\!] = \lambda P_{\langle i,\langle e,t\rangle\rangle}.\, \lambda t.\, \lambda x.\, \exists t' [t' < t \;\&\; P(t')(x)]$

The Nominal Temporality Marker *-rã̃*. Below is another example employing the temporal marker *-rã̃*.

(98) *Kuehe a-hecha peteĩ abogado-rã̃-me.*
yesterday 1sg.-see one lawyer-FUTURE-LOC.
"Yesterday I saw a future lawyer."
(Tonhauser 2006, p. 203, ex. (45a)

"In a nutshell, the analysis maintains that *–rã̃* is felicitous when the situation at the perspective time t_2 is such that it supports the assumption that, all things staying the way they are and proceeding as normal, the individual denoted by the noun phrase (or a spatio-temporal continuation of it) will have the property P at a time t_1 in the future of t_2." (Tonhauser 2006, p. 211)

(99) $[\![\text{-}r\tilde{a}]\!] = \lambda P_{\langle i,\langle e,t\rangle\rangle}.\, \lambda t.\, \lambda x.$ for all w' compatible with the circumstances in which events that would impede the prospective eventuality do not occur, $\exists t' [t' > t \;\&\; P(t')(x) = 1]]$

(cf. Tonhauser 2006, ex. (70), p. 216)

Concluding Remarks. "While the nominal temporality markers of Guaraní and other languages provided the motivation for this study of nominal temporality, one of the (perhaps perplexing) results of this dissertation is that the nominal temporality expressions of well-studied languages like English and German are at least equally interesting and equally understudied." (Tonhauser 2006, p. 377)

7 Temporal Adjectives in English and German

As Tonhauser (2006, p. 32) notices, temporal adjectives in English "...have received surprisingly little attention in the literature." To my knowledge, Dowty, Wall, and Peters (1981); Larson and Cho (1999), and Kusumoto (2005) are among the few to briefly discuss their semantics.

(100) *All my friends in the movie are other* ***former*** *child stars, says David.*
(Tonhauser 2006, p. 31, ex. (22))

(101) *About eighty per cent of smokers put on weight when they quit.*
However most ***ex****-smokers only gain a modest amount of weight.*
(Tonhauser 2006, p. 32, ex. (23))

(102) *But despite the fact that this kind of odd questioning from the* ***future*** *employer happens surprisingly often, please bear in mind that it is not appropriate for anyone to ask you if you'd accept something until it is actually offered.*
(Tonhauser 2006, p. 45, ex. (47))

(103) *As coalition forces struggle to withdraw from Iraq and stabilize Afghanistan, an interview with a* ***would-be*** *suicide bomber shows that the Islamist foe remains elusive, motivated, and on the move.*

(104) *The real question is what will the* ***then*** *President do if we uncover the plot to explode a nuclear weapon.*

Apparently, temporal adjectives in English may be stacked, as the two examples below illustrate.

(105) a. *Someone who could be described as a* ***former future*** *leader is the young prime minister of Hesse, Roland Koch, but his chances have been destroyed in the secret funds affair and many people expect him to lose his position in the scandal-hit state soon.*
b. *A former spouse annuity or eligibility for a* ***future former*** *spouse annuity terminates on the last day of the month before the month in which the former spouse remarries before attaining age 55.*
(Tonhauser 2006, p. 30, ex. (36))

Temporal adjectives do not seem to be anaphoric, as Tonhauser (2006, p. 38, ex. (35)) observes:

(106) *In 1980, my former mother-in-law bought a house.*

Notice, however, that *then* is anaphoric.[2] Consider the version of (106) below.

(107) *In 1980, my then mother-in-law bought a house.*

[2] Thanks to Sigrid Beck for pointing this out to me.

German. When compared to English, German has a considerable number of temporal adjectives at its disposal, e.g. *später*, *ehemalig*, *vormalige*, *früher, damalig, zwischenzeitlich, gestrig*, and *einstig* for past; *jetzig, augenblicklich, aktuell, gegenwärtig*, and *derzeitig* for present.

Temporal Donkey Sentences.

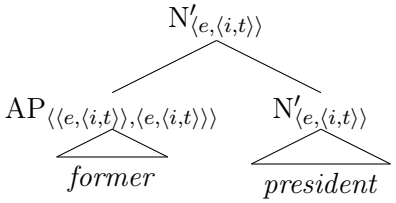
(108) a. *I like every former president.*
b. *I like every person who was a president.*
(Kusumoto 2005, p. 345, ex. (68))

(109) $[\![\, \textit{former} \,]\!] = \lambda P_{\langle e,\langle i,t\rangle\rangle}.\, \lambda x.\, \lambda t.\, \exists t' \, [t' < t \;\&\; P(x)(t')]$

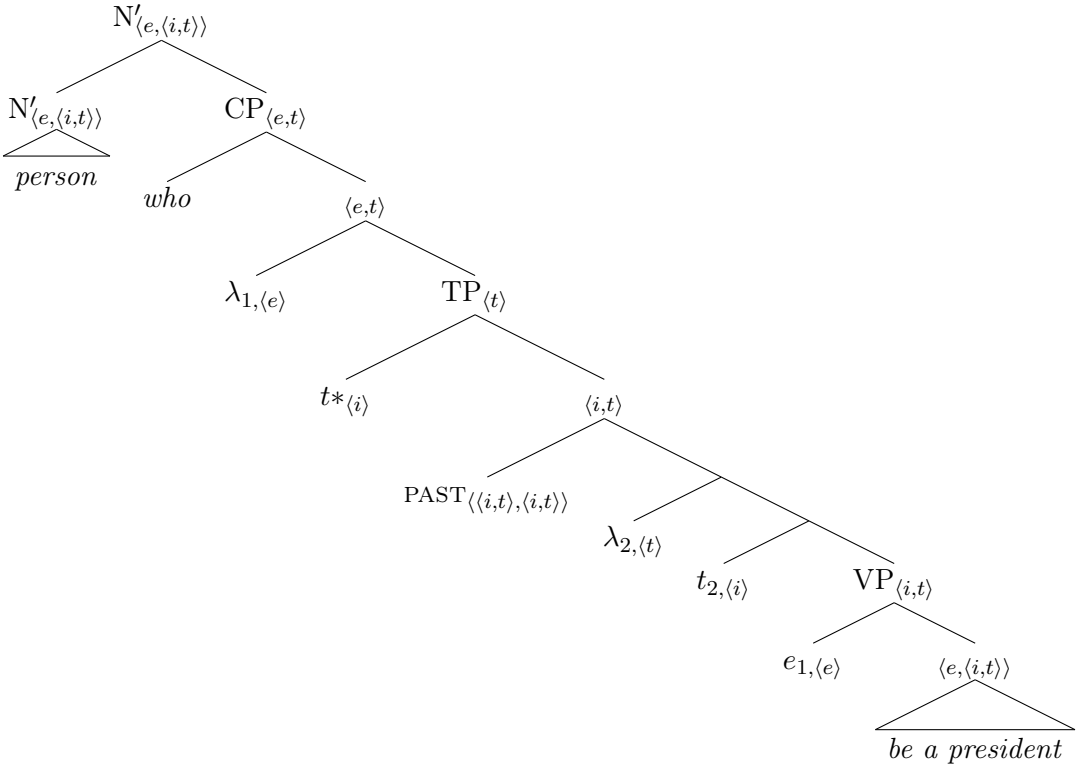
(110) $[\![\, \textit{person who was a president} \,]\!] = \lambda x.\, \lambda t.\, \mathsf{person}(x)(t) \;\&\; \exists t' \, [t' < t \;\&\; \mathsf{president}(x)(t')]$

(111) $[\![\, \textit{former president} \,]\!] = \lambda x.\, \lambda t.\, \exists t' \, [t' < t \;\&\; \mathsf{president}(x)(t')]$

(112) a.



b.



(113) a. *Every person who was a president believes now that he did a good job then.*
b. ??*Every former president believes now that he did a good job then.*
(Kusumoto 2005, p. 345, ex. (70))

(114) a. *Every man who has a wife sits next to her.*
b. ??*Every married man sits next to her.*

In (114-a), the indefinite Noun Phrase *wife* may be the appropriate antecedent for the pronoun like *her*, whereas in (114-b), no element can serve as the antecedent. Assuming that temporal donkey sentences are treated alike, Kusumoto (2005, pp. 346-347) suggests that the adverb *then* needs a linguistic antecedent. In our example, the adverb picks up "...the time variable is the past tense morpheme in the relative clause." In (113-b) on the other hand, "...there is no linguistic material that can serve as an antecedent of the E-type pronoun *then*."

Exercise 7.1:
Recall that – on the proposal that we've explored so far – only presuppositional determiners introduce quantification over times, whereas non-presuppositional determiners don't.

(115) *I met a former president.*

Explore the consequences of this distinction in the context of the semantics of temporal adjectives by compositionally interpreting the sentence in (108-a) above and the sentence in (115) below. Make use of the lexical entry for *former* from above.

References

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