A Basic Introduction to the Semantics of Tense

1. Introducing Evaluation Times

(1) **Obvious, Fundamental Fact about Sentences of English**
The truth of some sentences (of English) depends upon the time they are uttered.

“Barack is president”
- True on 1/19/2016
- False on 1/21/2016

(2) **Classic Intuition**
The fact in (1) seems similar to the fact that the truth of a sentence can depend upon the *possible world* that it’s uttered in.

“Unicorns exist.”
- False in w₀
- True in those worlds where the events of *The Last Unicorn* take place.

(3) **Classic Idea**
It seems, then, that the extension of an expression (e.g., truth-value of a sentence) should be calculated relative to (i) a possible world, (ii) a variable assignment, and (iii) a time

(4) **What is Time?**
We can be agnostic about the ‘ultimate nature’ of time (thank the gods!). But, we should lay out some axiomatic assumptions concerning its structure.

a. **Moments:** Time is made up of infinitesimally small ‘moments’ (or ‘instants’)
   \[ M = \text{the set of moments (instants)} \]

b. **Ordering:** The set M is structured into a dense, strict total ordering (<)
   - Asymmetric: If \( a < b \) then it’s not the case that \( b < a \)
   - Transitive: If \( a < b \) and \( b < c \), then \( a < c \)
   - Total: For all \( a, b \in M \), either \( a < b \), \( b < a \), or \( a = b \)
   - Dense: For all \( a, b \in M \), if \( a < b \), there is a \( c \in M \) such that \( a < c \) and \( c < b \)

c. **Intervals:** Time can be divided up into ‘temporal intervals’
   \[ \text{Interval } I \text{ of } M = I \subseteq M \text{ and for all } a, b \in I, \text{ if } a < c \text{ and } c < b, \text{ then } c \in I \]

d. **Semantic Type for Times:** \( i \) (apocryphal mnemonic: ‘intervals of instants’)

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1 The material in this handout is loosely based upon the content in von Fintel & Heim 2021 [pages 103-120]. Similar material is presented slightly differently in Ogihara 2011 [Sections 1-2, 4-5] and von Stechow 2009 [Sections 1-11.2].
(5) **Important Relations Between Intervals**

a. **Overlap:** \( I \cap I' \neq \emptyset \)

b. **Subinterval:** \( I \subseteq I' \) (definition the same as for sets)

c. **Precedence:** \( I < I' \) For all \( i \in I \) and \( i' \in I' \), \( i < i' \)
  (every moment in \( I \) precedes every moment in \( I' \))

(6) **Implementing the ‘Classic Idea’ in (3)**

\[
[[ XP ]]^{w,t,g} = \text{‘the extension of } XP \text{ relative to world } w, \text{ variable assignment } g, \text{ and time } t'
\]

- Just as \( w \) is called ‘the evaluation world’, we refer to \( t \) as ‘the evaluation time’
- Right now, we can be a little agnostic as to whether the evaluation time is a moment or an interval of moments

(7) **Desired Result of a Compositional Semantics**

\[
[[ \text{Barack is president } ]]^{w,t,g} = T \quad \text{iff} \quad \text{Barack is president in world } w \text{ at time } t
\]

Thus:

- \([[[\text{Barack is president}]]]^{w_0, 1/19/2016, g} = T
- \([[[\text{Barack is president}]]]^{w_0, 1/21/2016, g} = F

2. **Modeling Tenses as Operators Shifting the Evaluation Time**

(8) **Another Classic Observation**

Contrasts like the following suggest that past tense may function semantically to shift the evaluation time of the sentence.

a. \([[[\text{Barack is president}]]]^{w_0, 1/21/2016, g} = F
b. \([[[\text{Barack was president}]]]^{w_0, 1/21/2016, g} = T

- Intuitively, (8b) is true in \( w_0 \) at time 1/21/2016 because there is a *past time* \( t' \) such that Barack is president in \( w_0 \) at \( t' \) (*i.e.*, \( t' = 1/19/2016 \))

c. \([[[\text{Barack is president}]]]^{w_0, 1/19/2008, g} = F
d. \([[[\text{Barack will be president}]]]^{w_0, 1/19/2008, g} = T

- Intuitively, (8d) is true in \( w_0 \) at time 1/19/2008 because there is a *future time* \( t' \) such that Barack is president in \( w_0 \) at \( t' \) (*i.e.*, \( t' = 1/21/2008 \))
Desired Results of a Compositional Semantics

a. \[ [[ \text{Barack is president} ]]^{w,t,g} = T \iff \text{Barack is president in world } w \text{ at time } t \]

b. \[ [[ \text{Barack was president} ]]^{w,t,g} = T \iff \exists t'. t' < t \& \text{Barack is president in world } w \text{ at time } t' \]

c. \[ [[ \text{Barack will be president} ]]^{w,t,g} = T \iff \exists t'. t < t' \& \text{Barack is president in world } w \text{ at time } t' \]

Obtaining the Desired Results, Part 1: The Functional Architecture of the Clause

Every sentence (of English) contains a T(ense) Phrase, whose complement is the VP

```
TP
  T
  \{ Past, Present, Future \}
     VP
```

Obtaining the Desired Results, Part 2: The VP-Internal Subject Hypothesis

The subject of a sentence is initially Merged as SpecVP; it then undergoes (A-)movement to SpecTP.

\[
[TP \text{ Past } [VP \text{ Barack [ be president ] } ] ] \quad \Rightarrow \quad [TP \text{ Barack [TP 1 [TP Past [VP } t_1 \text{ [ be president ] ] ] ] ] ]
\]

Obtaining the Desired Results, Part 3: Verb Raising and Tense Lowering

- English auxiliary verbs raise (via head-movement) to T
- English main verbs do not raise, but T undergoes lowering (at PF) to the main verb

- In either case, the raising/lowering has no semantic effect
  - The raising/lowering is basically ‘undone’ by LF (or happens only at PF)

a. Sentence: Barack was president.

b. PF: \[ [TP \text{ Barack [TP 1 [TP [ Past be}_{2} ] [VP } t_1 \text{ [ t_2 \text{ president } ] ] ] ] ] \text{ ‘was’} \]

c. LF: \[ [TP \text{ Barack [TP 1 [TP Past [VP } t_1 \text{ [ be president ] ] ] ] ]] \]
(13) **Obtaining the Desired Results, Part 4: Lexical Semantics of Predicates**

We encode in their lexical semantics the fact that the extension of a predicate depends upon the evaluation time.

a. \[ ]^{w,t,g} \text{president} = [\lambda x : x \text{ president in } w \text{ at } t ]

b. \[ ]^{w,t,g} \text{be} = [\lambda P_{<e,t>} : P ]

(14) **Obtaining the Desired Semantics, Key Ingredient: Tense as a Sentential Operator**

a. **Special, Syncategorematic Rule for Present Tense**

\[ ]^{w,t,g} \text{Pres XP} = [\text{XP}]^{w,t,g} \]

\[\text{[Pres XP] is true at world } w \text{ and time } t \text{ iff XP is true at world } w \text{ and time } t\]

b. **Special, Syncategorematic Rule for Past Tense**

\[ ]^{w,t,g} \text{Past XP} = T \text{ iff } \exists t' . t' < t \text{ & } [\text{XP}]^{w,t',g} = T \]

\[\text{[Past XP] is true at world } w \text{ and time } t \text{ iff there is a time } t' \text{ preceding } t \text{ such that XP is true at world } w \text{ and time } t\]

c. **Special, Syncategorematic Rule for Future Tense**

\[ ]^{w,t,g} \text{Fut XP} = T \text{ iff } \exists t' . t < t' \text{ & } [\text{XP}]^{w,t',g} = T \]

\[\text{[Fut XP] is true at world } w \text{ and time } t \text{ iff there is a time } t' \text{ following } t \text{ such that XP is true at world } w \text{ and time } t\]

(15) **Predictions of This System (Calculations Left to the Reader)**

a. (i) **Sentence:** “Barack is president”

(ii) **LF:** \[TP \text{ Barack } [TP \text{ 1 } [TP \text{ Pres } [VP \text{ ti } [\text{ be president } ] ] ] ] ]

(iii) **Truth-Conditions:**

\[[(15aii)]^{w,t,g} = T \text{ iff Barack is president in } w \text{ at } t\]

b. (i) **Sentence:** “Barack was president”

(ii) **LF:** \[TP \text{ Barack } [TP \text{ 1 } [TP \text{ Past } [VP \text{ ti } [\text{ be president } ] ] ] ] ]

(iii) **Truth-Conditions:**

\[[(15bii)]^{w,t,g} = T \text{ iff } \exists t' . t' < t \text{ & Barack is president in } w \text{ at } t\]

c. (i) **Sentence:** “Barack will be president”

(ii) **LF:** \[TP \text{ Barack } [TP \text{ 1 } [TP \text{ Fut } [VP \text{ ti } [\text{ be president } ] ] ] ] ]

(iii) **Truth-Conditions:**

\[[(15cii)]^{w,t,g} = T \text{ iff } \exists t' . t < t' \text{ & Barack is president in } w \text{ at } t\]
3. The Problem of Tensed Complement Clauses: A First Encounter

(16) Long-Observed Fact About English (and Other Languages)

- The sentence below seems to be ambiguous
- It can be true in the scenarios (a) and (b); however, it isn’t true in scenario (c)

a. Sentence: Dave thought Barack was president.

   (i) Simultaneous Reading: Dave thought “Barack is president”
   (ii) Back-Shifted Reading: Dave thought “Barack was president”
   (iii) Forward-Shifted Reading: * Dave thought “Barack will be president”

Side Note: Just because (16a) is true in both (i) and (ii) doesn’t mean it’s ambiguous… It could instead have a general meaning that covers both situations…

Question for Reader: How would you show that (16a) is truly ambiguous?

(17) Towards an Analysis, First Ingredient

To begin, given that we now have evaluation times as well as evaluation worlds, we might naturally want to revise our conception of what an ‘intension’ is…

- The intension of an expression maps a possible world and time onto the extension of that expression at that world and time

b. \[ \lambda w' : [ \lambda t' : [[[XP]]^{w',t',g} ] ] = \text{the intension of XP} \]

- If the extension of XP is type \( \tau \), then its intension is type \( <s,<i,\tau>> \)

- Thus, a proposition is now a function of type \( <s,<i,t>> \)

(18) Towards a Solution, Second Ingredient

Given our revised conception of ‘intensions’, we need to slightly revise our tools for compositionally deriving intensions…

(Revised) Intensional Function Application [Option 1]

If X is a structure consisting of two daughters – Y and Z – and if \( [[Y]]^{w,t,g} \) is a function whose domain contains \( \lambda w' : [ \lambda t' : [[[Z]]^{w',t',g} ] ] \), then:

\[ [[X]]^{w,t,g} = [[Y]]^{w,t,g} ( [ \lambda w' : [ \lambda t' : [[[Z]]^{w',t',g} ] ] ) \]
(19) **Towards a Solution, Third Ingredient**

- In our original semantics for ‘thinks’ and ‘believes’, the ‘belief-worlds’ of an entity (at a world) basically form a proposition
  - It’s the proposition summing up all the individual beliefs of x (at w)
- Given our revised conception of a ‘proposition’, it would be natural to slightly revise our definition of ‘Beliefs’:
  a. Beliefs(x,w,t) is a set of world-time pairs <w’,t’>, such that:
     - <w’,t’> is consistent with the beliefs of x (in w at t)
     - All of x’s beliefs (in w at t) hold at <w’,t’>
     - According to their beliefs (in w at t), x might be in w’ at time t’

(20) **Towards a Solution, Fourth Ingredient**

Given all the revisions above, we should accordingly revise our semantics for thinks

\[
[[ \text{believes / thinks} ]]_{w,t,g} = \left[ \lambda p_{<s,<i,t>} : \forall <w’,t’> \in \text{Beliefs}(x,w,t) . p(w’)(t’) = T \right]
\]

(21) **Key Result of These Revisions: Back-Shifted Readings**

a. **Sentence:** Dave thought that Barack was president.

b. **LF:**
   \[
   \]

c. **Predicted Truth-Conditions:** (Calculation left to the reader)

\[
\exists t’ . t’ < t \land \forall <w’, t’’> \in \text{Beliefs}(\text{Dave},w,t’) . \\
\exists t’’ . t’’’ < t’’ . & \text{Barack is president in w’ at t’’’}
\]

*There is a time t’ before t (now) such that in all of Dave’s belief worlds-times <w’,t’’> in w at t’, there is a time t’’ before t’’ such that Barack is president in w’ at t’’’*  

Dave thought that he occupied a world/time where Barack was president in the past.

(22) **Problem!**

Unfortunately, our system only predicts the existence of the ‘back-shifted’ reading in (16b)

- We don’t yet predict that (21a) is also true in scenario (16a)
Towards the ‘Simultaneous Reading’

Notice that if there were no embedded tense in the subordinate clause, then we would generate truth-conditions that hold in (16a):

\[ \text{LF: } [ \text{Dave} \ 1 \ \text{Past} \ [ t_1 \ \text{think} \ [ \text{Barack} \ 2 \ \text{be president} ] \ldots ] \]

b. Predicted Truth-Conditions: (Calculation left as exercise to reader)

\[ \exists t' \cdot t' < t \land \forall w' \cdot t'' \in \text{Beliefs(Dave, w', t')} \cdot \text{Barack is president in w' at t''} \]

Dave thought that he occupied a world/time where Barack is president

Some Preliminary Tools to Derive the ‘Simultaneous Reading’

Special Rule of Tense Deletion
If CP is complement to VP, which is complement to [Past], and TP’ is complement to CP, then if TP’ is headed by [Past], the head of TP’ can optionally delete before LF

\[ \text{[TP Past [VP V [CP C [TP Past VP']...]]} \rightarrow \text{[TP Past [VP V [CP C [TP VP']...]]} \]

Evidence Supporting ‘Tense Deletion’: Kamp-Abusch Sentences

a. Sentence:
Dave said yesterday [ that one week later he would think [ he felt better ] ] ]

b. Verifying Scenario:
Dave has been sick lately. However, when you talked to him yesterday, he was sure that he would start improving soon. In fact, he said “One week from now, I will think that I feel better.”

c. Key Observation:

- In scenario (b), the event of the ‘feeling better’ does not precede any time mentioned in the sentence
  - It’s six days after the utterance time
  - It’s seven days after Dave’s (past) saying event
  - It’s at the same time as the (future) thinking event

- However, the embedded clause headed by ‘feel’ bears past tense!

- This suggests that the most deeply embedded past tense in (27a) really isn’t interpreted...
  - And our rule in (24) would allow us to delete that tense from the LF!
4. Some Problems for the Simple Operator Semantics for Tense

4.1 The Anaphoric Behavior of Tense

The way that our semantics in (14b,c) quantifies over all times ends up leading to problems, especially when negation enters the picture…

(26) The Classic Example (Partee 1973)

a. Context: You’ve just baked some cookies, and are driving them over to a friend’s house. While you’re on the road, you suddenly realize that you left the stove on.

b. Sentence: (Oh no!) I didn’t turn off the stove!

Our semantics for past tense in (14b) cannot predict the truth/felicity of (26b) in scenario (26a), no matter what scope is assigned to negation and tense…

(27) Predictions of Our Operator Semantics

a. Tense Scoping Over Negation: \[ 1 [ 1 [ \text{Past} [ \text{Not} [ t_1 \text{ turn off stove } ] ] ] ] … \]

Predicted Truth Conditions

\[ \exists t'. t' < t & \text{it is not the case that I turned off the stove in w at t’} \]

b. Negation Scoping Over Tense \[ 1 [ 1 [ \text{Not} [ \text{Past} [ t_1 \text{ turn off stove } ] ] ] ] … \]

Predicted Truth Conditions

It is not the case that \[ \exists t'. t' < t & \text{I turned off the stove in w at t’} \]

- The reading in (27a) is too weak; it’s made true simply by the fact that I’ve been driving my car for the last five minutes.
- The reading in (27b) is too strong; it says that it’s never (ever) been the case that I’ve turned off the stove.

(28) Some Informal Reflections on the Intuitive ‘Meaning’ of (26b)

- We intuitively understand (26b) to be ‘talking about’ only a salient, limited past time
  - Roughly, it says that at the time since you took the cookies out, it isn’t the case that you turned off the stove
- Thus, tensed sentences don’t seem to be general statements about the past…
  … rather, they are statements about specific past times, ones salient in the context
- In this way, tenses seem to behave a little bit like pronouns (Partee 1973)
4.2 The Compositional Semantics of Temporal Adverbs

Another major problem for our semantics in (14) is the way that it assumes VPs are of type <e,t>

(29) The Problem: Temporal Adverbials

a. **Sentence:** Dave left yesterday.

b. **Plausible Truth-Conditions:**
\[ \exists t'. t' < t & \text{Dave leaves } x \text{ in } w \text{ at } t' \text{ and } t' \text{ is on the day preceding } t \]

c. **The Problem:** How can we derive something like (29b) from the LF for (29a)?
   - In our current system, the verb *left* is of type <e,t> (13)
   - Any higher constituent (VP, TP) ends up being of type t or type <e,t>
   - **Thus, in our current system, the only way that something can modify the time of predication is by shifting the evaluation time.**

d. **A (Failed) Attempt:**
\[[ \text{yesterday } X P ]^{w,t,g} = T \text{ iff } \exists t'. [(X P)]^{w,t,g} = T \text{ and } t' \text{ is on the day preceding } t\]

(30) Immediate Problem with Semantics in (29d)

If *both* past-tense and adverbs like ‘yesterday’ shift the evaluation time, we wrongly get ‘double shifting’ of the evaluation time in sentences like (29a):

a. (i) **First Possible LF for (34a):** [ Past [ Yesterday [ Dave leave ] ] ]
   (Dave leaves on the day preceding some past time t’)

   (ii) **Predicted Truth-Conditions:**
   \[ \exists t'. t' < t & \exists t''. \text{Dave leaves in } w \text{ at } t'' & t'' \text{ is on the day preceding } t' \]

b. (i) **Second Possible LF for (34a):** [ Yesterday [ Past [ Dave leave ] ] ]
   (Dave leaves at a time preceding a time yesterday.)
5. Current Approaches to Tense Semantics: Tense as Pronoun vs. Tense as Quantifier

There are currently two general approaches to tense semantics that solve the problems above.

(31) Common Ground Between the Two Approaches

a. Time Arguments: The complement of TP projects an argument over times

• This is the half the solution to the problem in Section 4.2

b. No Shifting: While the semantics of T is sensitive to the evaluation time, tense itself does not actually shift the evaluation time.

• This is the other half of the solution to the problem in Section 4.2

b. Anaphoric Behavior: There is something ‘pronominal’/‘anaphoric’ in the meaning of tense

• This is the general solution to the problem in Section 4.1

In as much as there is general consensus on these points, we could say that these are (some of) the things that the field has learned about the nature of tense semantics...

5.1 Tense as a (Restricted) Indefinite

The first family of approaches views T-heads as being something like indefinite determiners...

(32) Tense as an Indefinite, First Ingredient: Verbs and Temporal Arguments

- Verbs have an argument place for times

- e.g., an intransitive verb is now of type <e,<i,t>>; transitives are <e,<e,<i,t>>, etc.

- This time argument can be either an interval or a moment
  - To simplify things, we could assume that ‘moments’ are just singleton intervals.

a. \[
[[ \text{dance} ]]^{w,t,g} = \lambda x_e : [ \lambda t_i : x \text{ dances in } w \text{ at } t ]
\]

b. \[
[[ \text{marry} ]]^{w,t,g} = \lambda y_e : [ \lambda x_e : [ \lambda t_i : x \text{ marries } y \text{ in } w \text{ at } t ]]
\]

- Thus, a VP will now always end up being type <i,t>...
(33) **Tense as an Indefinite, Second Ingredient: Tenses as (Restricted) Quantifiers**

- Since VPs are type <i,t>, we could analyze tenses (T-heads) as being *temporal generalized quantifiers, of type <<i,t>,t>*
- In addition to being of type <<i,t>,t>, tenses come packed with an index
- As shown below, this index must be mapped to a set (interval) of times

\[
[[ \text{Past} ]]^{w,t,g} = [\lambda P_{<i,t}> : \exists t'. t' < t & t' \in g(i) & P(t') = T ]
\]

‘there is a time t’ before the evaluation time t and *within the interval g(i) s.t. P(t') = T’

\[
[[ \text{Presi} ]]^{w,t,g} = [\lambda P_{<i,t}> : \exists t'. t' = t & P(t') = T ]
\]

‘there is a time t’ *that equals the evaluation time t and P(t') = T’

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(34) **Illustration: Solution to the Problem in Section 4.1**

a. **Sentence:** I didn’t turn off the stove!

b. **LF:** [TP I [TP Neg [TP Past2 [VP t1 turn off the stove ] … ]]

c. **Predicted Truth-Conditions:**

   It is not the case that $\exists t'. t' < t & t' \in g(2) & I \text{ turn off the stove.}$

   *There is no past time within g(2) when I turned off the stove.*

- If ‘g’ maps index 2 to the temporal interval stretching from when I took the cookies out to when I left the house, *then we predict (34a) is true and felicitous in context (26a)!*

(35) **An Analysis of Temporal Adverbs**

We can model temporal adverbs as being type <i,t>, and combining with the VP via PM

a. $[[ \text{yesterday} ]]^{w,t,g} = [\lambda t' : t’ is on the day preceding t ]$

b. **Illustration:**

   i. $[[ [VP [VP Dave leaves ] yesterday ] ]]^{w,t,g} = \text{(by PM)}$

   ii. $[\lambda t' : [[\text{Dave leaves}]]^{w,t,g}(t') & [[\text{yesterday}]]^{w,t,g}(t') ] = \text{(by TN, LC)}$

   iii. $[\lambda t' : \text{Dave leaves in w at t’ & t’ is on the day preceding t } ]$
(36) **Illustration: Solution to the Problem in Section 4.2**

a. **Sentence:** Dave left yesterday

b. **LF:** $[\text{TP Dave} \ [\text{TP 1} \ [\text{TP Past} \ [\text{VP 1 leaves } \text{ yesterday } ] ] ] ]$

c. **Predicted Truth-Conditions (Compare to (29b))**

\[ \exists t'. t' < t \land t' \in g(2) \land \text{Dave leaves in w at } t' \land t' \text{ is on the day preceding } t \]

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5.2 **Tense as a Pronoun**

The second family of approaches traces its lineage back to Partee (1973), and is just as well-attested in the literature on tense than the ‘indefinite’ approach from Section 5.1…

- It shares with the ‘indefinite’ approach the assumption in (32) that the complement of TP is of type $<i,t>$
- However, it views the Tense heads as being of type $i$ (rather than $<<i,t>,t>$)

(37) **Tense as Pronoun Referring to Times**

- T-heads are pronominal anaphors referring directly to temporal intervals (or moments).
- As anaphors, they bear a pronominal index, and their extension is determined by the variable assignment.
- The tense features introduce presuppositions that restrict the potential referents of these pronouns (just like phi-features on type e pronouns)

a. $[[ \text{Past}_i ]]^{w,i,g}$ is defined only if $g(i) < t$; if defined, then $[[ \text{Past}_i ]]^{w,i,g} = g(i)$

b. $[[ \text{Pres}_i ]]^{w,i,g}$ is defined only if $g(i) = t$; if defined, then $[[ \text{Pres}_i ]]^{w,i,g} = g(i)$

(38) **Illustration: Solution to the Problem in Section 4.1**

a. **Type $<i,t,i>$ Semantics for Negation:** $[ \lambda P_{<i,t,i>} : [ \lambda t : P(t) = F ] ]$

b. **Sentence:** I didn’t turn off the stove!

c. **LF (given (44a)):** $[\text{TP 1} \ [\text{TP Past}_2 \ [\text{NegP Neg} \ [\text{VP 1 turn off the stove } ] ] ] ]$

d. **Predicted Truth-Conditions:**

(i) $[[44c]]^{w,i,g}$ is defined only if $g(2) < t$

(ii) $[[44c]]^{w,i,g} = T$ **iff** It is not the case that I turn off the stove in w at $g(2)$

And, again, in (26a), we can take $g(2)$ to be the time following the removal of the cookies.
(39) **Illustration: Solution to the Problem in Section 4.2**

Again, since we still assume that VPs are of type \( <i,t> \), the approach to adverbial modification in (35)-(36) can also be adopted by ‘pronominal tense’ theories.

a. **LF:** \[ TP \text{Dave} \left[ TP \text{Past} \left[ VP t_1 \text{leaves} \right] \text{yesterday} \right] \ldots \]

b. **Predicted Truth-Conditions (Compare to (41c))**

(i) \([(39a))]^{w,t,g} \text{is defined only if } g(2) < t \]

(ii) \([(39a))]^{w,t,g} = T \text{iff} \text{Dave leaves in } w \text{ at } g(2) \text{ & } g(2) \text{is on the day preceding } t \]

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5.3 **Comparing the Two Families of Approaches**

(40) a. **Obvious Question:**

Are there any arguments for one of the two preceding approaches over the other (tense as quantifier vs. tense as pronoun)?

b. **Answer:**

As with so many other things in our field, it is difficult to empirically decide between the ‘quantificational’ and the ‘referential/pronominal’ approaches to tense

- Both have been modified and developed to account for broadly the same kinds of phenomena.

- **However, some have argued that the two analyses are correct for different languages** (Ogihara & Sharvit 2012, Sharvit 2014, Chen et al. 2020)

c. **Historical Aside**

- The ‘pronominal approach’ was the first alternative offered to the ‘operator approach’ of Section 2 (Partee 1973)…
  - However, the quantificational alternative in Section 5.1 was very quickly pointed out.

- Enç (1987) and Abusch (1997) later argued that the behavior of *embedded* tense lent support to the pronominal approach…
  - But then Ogihara (1996) showed that their key results can also be achieved with a quantificational semantics.
An Argument Commonly, Classically Raised Against a Pronominal Theory of Tense

- Unlike with regular, nominal pronouns, it is possible to use past-tenses ‘out of the blue’.
- In such cases, the past-tense sentence *doesn’t seem* to be anaphoric to *any* contextually salient, topical time.

a. Illustration:  
   (i) Hey, tell me something interesting about the universe.
   (ii) Well, dark energy **inflated** it massively.

Some Responses to This Argument

a. The ‘Tu Quoque’ Response:

   If contextual restriction is built into the meaning of the quantificational semantics (33), then quantificational analyses of tense face a parallel problem with (41a).

b. The ‘All of Past Time’ Response:

   - As Partee herself pointed out, cases like (41a) may involve the past-tense denoting *all of past-time*, which could plausibly be accommodated in any context…
   - Exactly how this would work with the semantics in Section 5.2 will become clearer once we’ve laid out a semantics for ‘(perfective) aspect’…

b. The ‘Rescuing Existential Binding’ Response

Another response to the facts in (41a) is that there is something special that allows the past-tense T-node (in English) to be existentially bound in cases like (41aii).

- According to some, there can be a kind of unspoken ‘once’ in such sentences

(i) \[ \text{LF of (48aii)} \]

\[ [\text{TP } \text{Once} \text{[TP Dark energy [TP 2 [T Past] [VP ... ]]]}] \]

(ii) \[ \text{Predicted Truth-Conditions: } \exists t'. t' < t \text{ & dark energy inflated ...} \]

- According to others (Kratzer 1998), English is distinct from other languages in that their (simple) past-tense can be interpreted as *present perfect* (*i.e.*, ‘Dark energy *has inflated it massively*’…
  - And so there may be an underlying structure / parse to a (simple) past tense sentence where there is no (true) past T-head…
(43) A Consideration Against the Quantificational Semantics for Tense

- As shown in (34), under the quantificational semantics for tense, negation must out-scope tense in sentences like ‘I didn’t turn off the stove’.

- However, syntacticians have their own empirical, purely syntactic arguments that negation actually appears within the complement to the T-head:

  \[ [TP \ T [NegP \ Neg [VP \ V \ldots \ ] ] ] \]

- As shown in (38), though, a pronominal/referential semantics for tense can account for such sentences while allowing T to out-scope Neg.

(44) Another Consideration Against the Quantificational Semantics for Tense

It’s been argued that under a pronominal analysis for tense, the ‘tense deletion’ rule in (24) could follow from more general processes/mechanisms regarding feature-agreement in bound pronouns (Kratzer 1998, 2009).

- These would be the same mechanisms that seem to delete the person features of bound personal pronouns, in sentences like (44a) under readings like (44b):

  a. **Sentence:** Only I did my homework.

  b. **Bound Reading:** I did my homework, and for all x, if x ≠ me, then x did not do x’s homework.