LSA.311: Lecture 11

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Where We Were

- Intensional semantics
- Two kinds of parameters of evaluation
  - utterance context parameters
    - world, time, speaker at a minimum
  - index of evaluation parameters
    - world, time
- Only the index parameters are shifted away by operators
- Question: why does the index not have three parameters like the context?

Proposition Expressed

- An utterance of a sentence ϕ by s in world w at t expresses the proposition $\lambda w.[\![\phi]\!]^{c,\langle w,t_c\rangle}$.

Simple Belief

- *John believes that it is raining*
- propositional attitude
- relation between an individual (John) and a proposition (that it is raining)
- what proposition precisely?
- the proposition expressed by *it is raining*
  - $\lambda w.$ it is raining in w
  - raining when?

Hintikka-Semantics for Belief

- $[\![z \text{ believes } \phi]\!]^{c,i} = 1$ iff
- all of the worlds w' compatible with what z believes in w_i at t_i are such that
  - $(\lambda w.[\![\phi]\!]^{c,\langle w,t_c\rangle})(w') = 1$.
- Doxastic alternatives for x in w at t:
  - $\text{Dox}_{w,t,x} = \{w' : \text{for all that } x \text{ in } w \text{ at } t \text{ can tell, s/he might be located in } w'\}$.
- $[\![z \text{ believes } \phi]\!]^{c,i} = 1$ iff
  - $\text{Dox}_{w_i,t_i,z} \subseteq \lambda w.[\![\phi]\!]^{c,\langle w,t_c\rangle}$.
- What time is it?
  - The times in ϕ are interpreted relative to the context.
  - Is that right?

What time is it?

- *John believed it to be raining* uttered at t_c
- $\lambda w.[\![\text{it to be raining}]\!]^{c,\langle w,t_c\rangle}$
  - $\Rightarrow \lambda w.$ it is raining in w at t_c
- No! John's belief is *not* about what is happening *now* as we are speaking but about how things were when he was believing.

What time is it?

- Evidently, the time reference of raining does not remain free and refer to the utterance time.
- Something seems to "bind" it.
- What?
  - the higher tense
  - the attitude verb

Tense-Binding?

- $[\![z \text{ believes } \phi]\!]^{c,i} = 1$ iff
  - $\text{Dox}_{w_i,t_i,z} \subseteq \lambda w.[\![\phi]\!]^{c,\langle w,t_i\rangle}$.
- *believe* passes the current index time down to the embedded clause
- Now, if a tense occurs above *believe* it will control both the time of believing and the time reference of the embedded clause.
- PAST John believe [rain]
- There is a past time t such that it is raining at t in all worlds which conform to what John believes at t.

Four Worlds

- w_c: rain at 4 am, John awake at 4 am
- w_1: rain at 4 am, John awake at 5 am
- w_2: rain at 5 am, John awake at 4 am
- w_3: rain at 5 am, John awake at 5 am
- In all four worlds, John wakes up at 4am, has no idea what time it is, hears a dripping noise, and says to himself "it's raining (now)".
- Which worlds conform to what John believes at 4 am in w_c?
- In which worlds is it raining at 4 am?
- Are the former a subset of the latter?
- Is *John believed it to be raining* true?

Four Worlds – Variant

- w_c: rain at 4 am, John awake at 4 am
- w_1: rain at 4 am, John awake at 5 am
- w_2: rain at 5 am, John awake at 4 am
- w_3: rain at 5 am, John awake at 5 am
- Everything is the same as above, except that John, when he wakes up, thinks it is 5 am and says to himself: "It was raining at 4 am."
- Which worlds conform to what John believes at 4 am in w_c?
- In which worlds is it raining at 4 am?
- Are the former a subset of the latter?
- Is *John believed it to be raining* true?

Belief *de nunc*

- *believe* (and other atttitude verbs) take temporally variable propositions as their arguments
  - They do *not* pass down the current index time.
  - Rather, we refine the notion of doxastic alternative
- $\text{Dox}_{w,t,x} = \{\langle w', t'\rangle$: for all that x in w at t can tell, s/he might be located in w' at $t'\}$.
- $[\![z \text{ believes } \phi]\!]^{c,i} = 1$ iff
  - $\text{Dox}_{w_i,t_i,z} \subseteq \lambda w, t.[\![\phi]\!]^{c,\langle w,t\rangle}$.
- PAST John believe [rain]
- John located himself at a raining-time.

Tensed Complements

- *John believed that it was raining*
  - two readings
    - simultaneous
    - (back-)shifted (some speakers prefer *John believed that it had been raining*)
- tense deletion
- PAST John believe [(PAST) rain]
- Object of belief:
  - $\lambda w, t.$ it is raining in w at t
  - $\lambda w, t.\exists t' \prec t$ it is raining in w at t'

Morgan's Observation

- J. Morgan (1970) "On the Criterion of Identity for NP Deletion," CLS 6.
- Situation: John is watching himself in the mirror, without realizing that it's he himself that he is watching. He thinks (pointing to his reflection): "He will get help."
- John expects that he will get help. (true, at least under one reading)
- John expects PRO to get help. (false)
- Note: Material on this slide and some of the following ones are borrowed from Irene Heim's lectures on pronouns.

More than Variable Binding

- Situation: Three men are watching themselves in the mirror, each without realizing that it's he himself that he is watching. Each one thinks (pointing to his reflection): "He will get help."
- Each man expects that he will get help. (true, at least under one reading)
- Each man expects PRO to get help. (false)

PRO must be read *de se*

- PRO must be read "de se".
- It can only be used to report an "I"-thought.
- John expects PRO to get help.
  - John thinks "I will get help"
- Each man expects PRO to get help.
  - Each man thinks "I will get help"

Doxastic Alternatives (Lewis)

- We need to refine the notion of doxastic alternatives (and the nature of the complement of attitude predicates) one more time
- $\text{Dox}_{w,t,z} = \{\langle w', t', z' \rangle$: for all that z in w at t can tell, s/he might be z' in w' at $t'\}$.

Famous Examples

- Rudolf Lingens lost in the Stanford Library
- Two Gods
- The guy in the mirror whose pants are on fire

Semantics of Attitudes

- attitude predicates takes as their arguments functions from world-time-individual triples to truth-values
  - centered propositions, properties
- how do complement sentences deliver these centered propositions?
  - intensions of sentences

  - make the index be a world-time-individual triple
- $[\![\phi]\!]^c_{\text{¢}} = \lambda w, t, x.[\![\phi]\!]^{c,\langle w,t,x\rangle}$
- $[\![z \text{ believes } \phi]\!]^{c,i} = 1$ iff
  - $\text{Dox}_{w_i,t_i,z} \subseteq \lambda w, t, x.[\![\phi]\!]^{c,\langle w,t,x\rangle}$

x coordinate usually idle

- $[\![\text{it is raining}]\!]^c_{\text{¢}} = \lambda w, t, x.$ it is raining in w at t
- believing such a proposition is just locating yourself in a world and at a time, without narrowing down who you are in that world at that time

PRO connects to x

- $[\![\text{PRO}]\!]^{c,i} = x_i$
- $[\![\text{PRO get help}]\!]^c_{\text{¢}} = \lambda w, t, x.x$ will get help in w at t
- Compare to normal pronoun:
  - $[\![\text{he get help}]\!]^{c,g}_{\text{¢}} = \lambda w, t, x.g(\text{he})$ will get help in w at t

Is *he* ambiguous?

- one reading: receives value from variable assignment
- other reading: refers to x-coordinate of index (= *de se* reading)

Unembedded PRO?

- What if a sentence with PRO occurred unembedded?
- $[\![\text{PRO get help}]\!]^{c,i} = 1$ iff x_i gets help in w_i at t_i
- Who is x_i for an unembedded context?

Alternative approaches

- Chierchia: complements express properties, PRO as a λ-operator
- Extensionalized intensional framework where worlds and times are object language arguments to expressions
- other literature: Castaneda, Perry, Higginbotham, etc.

Where We Are

- Today: *de se* attitudes, centered propositions
- Wednesday: Monsters?