Tutorial “Quantification and binding" and "Intensionality”

Session 2

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Our agenda today

- **Key concepts**
- **Assignment 1 (Intensionality)**
- **Q&A**

Intensionality as evaluation shifting

Human language is not restricted to discourse about here and now in the actual world w.

(4) a. In Hamburg, it is raining right now. **Spatial Displacement**

b. A few days ago, it rained. **Temporal Displacement**

c. If the low pressure system had not moved away, it might have been raining now. **Modal Displacement**

d. Burt **believes** that it is raining in New York. **Attitude verbs**

The sentences cannnot be captured by truth-conditions.

Intensionality as evaluation shifting

We need to move to a semantics that is ***intensional***. In other words:

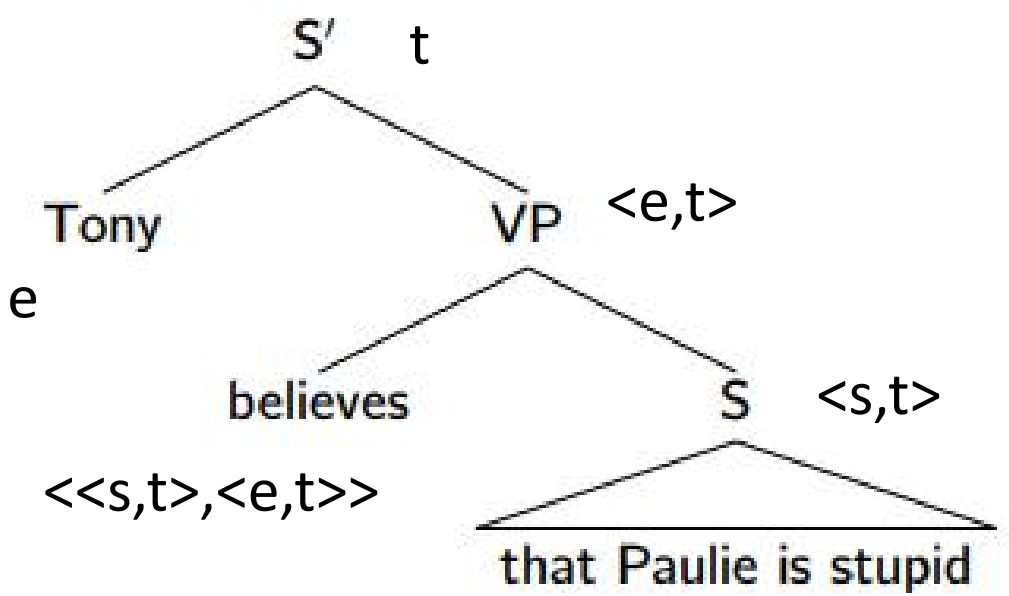
It has to contain *operators* that "displace" the evaluation of their complements from the actual here and now to other points of reference (spatially, temporally, and **modally** or under different **propositional attitudes**).

Intension

A function (with domain W) which maps every **possible world** to the **extension** of α in that world. **The intension is world independent.** A new basic semantic type: ***s***

$$[\![\alpha]\!]_{\not w} := \lambda \mathrm{w}.\ [\![\alpha]\!]^{w}$$

To understand “believe”



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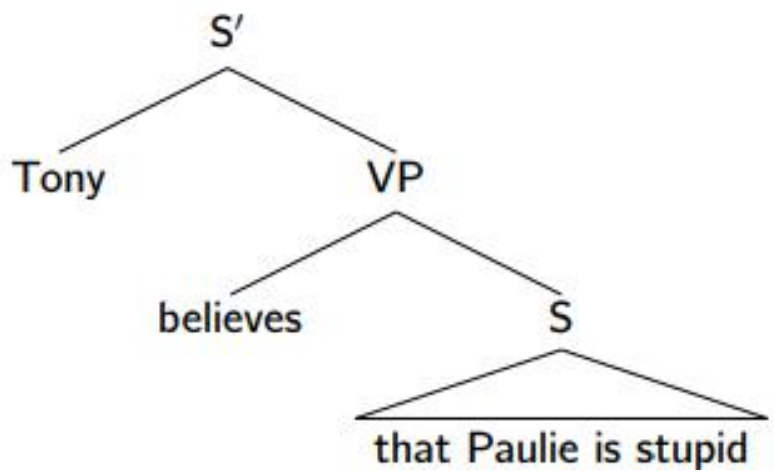


[[believes]]^{w} is a function: Proposition S of type <s,t> → A function VP from an individual (the belief holder) <e> to a truth-value <t>.

[[believes]]^{w} should be of type <<s,t>,<e,t>>.

To understand “believe”

What then are beliefs? Intuitively, beliefs represent ways that things are, according to the belief holder. Our beliefs simply leave too many questions unsettled.

For example, right now Tony doesn't know what kind of person Paulie is. The best he can do is to have ***a set of candidates*** $W_T^{\mathcal{B}}$ for the actual world *w*:

w_1: Paulie is smart in w_1.
w_2: Paulie is stupid in w_2.
w_3: Paulie is stupid in w_3.
w_4: Paulie is not stupid in w_4.
.....

$W_T^{\mathcal{B}}$

If Tony believes that Paulie is stupid, this means w_1 and w_4 must be excluded from Tony's set of candidate worlds $W_T^{\mathcal{B}}$. We say, w_1 and w_4 are not **compatible** with what Tony believes in the actual world *w*. w_2 and w_3 are **compatible** with what Tony believe in w.

Lexical entry of *believe*

$$[\![\text{believe}]\!]^w = \lambda p_{\langle s,t\rangle}.\ [\lambda x_e\ .\ \forall w'[w' \text{ is compatible with what } x \text{ believes in } w \rightarrow p(w') = 1]]$$

A new rule: Intensional functional application (IFA)

This semantics requires believe to be fed a sentence intension *p* as an argument. But our old rule only takes extension as argument.

If $\boldsymbol{\alpha}$ is a branching node and $\{\boldsymbol{\beta}, \boldsymbol{\gamma}\}$ is the set of $\boldsymbol{\alpha}$'s daughters, then for any possible world w and any assignment a, if $[\![\boldsymbol{\beta}]\!]^{w,a}$ is a function whose domain includes $[\![\boldsymbol{\gamma}]\!]^{a}_{¢}$, $[\![\boldsymbol{\alpha}]\!]^{w,a} = [\![\boldsymbol{\beta}]\!]^{w,a}([\![\boldsymbol{\gamma}]\!]^{a}_{¢})$.

Accessibility Relations

Another way of reformulating what we discussed above.

$$[\![\text{believe}]\!]^w = \lambda p_{\langle s,t\rangle}.\ [\lambda x_e\ .\ \forall w'[w' \text{ is compatible with what } x \text{ believes in } w \rightarrow p(w') = 1]]$$

If w' is compatible with x's belief state in w, we say w' is accessible given x's beliefs in w.

$$[\![\text{believe}]\!]^w = \lambda p_{\langle s,t\rangle}.\ [\lambda x_e\ .\ \forall w'[w\mathcal{R}_x^{\mathcal{B}}w' \rightarrow p(w') = 1]]$$

Reflexivity, veridicality, factivity

Reflexivity: An accessibility relation is reflexive iff for any object in the domain of the relation we know that the relation holds between that object and itself.

Veridicality: If an attitude *X* corresponds to a reflexive accessibility relation, an individual *X*s that p being true in w **entails** p is true.

Factivity: If an attitude *X* corresponds to a reflexive accessibility relation, an individual *X*s that p being true **presupposes** p is true.

Universal vs. existential quantification over worlds

$$[\![\textbf{must}]\!]^w = \lambda p \in D_{\langle s,t\rangle} \; . \; \forall w'[w\mathcal{R}w' \rightarrow p(w') = 1]$$

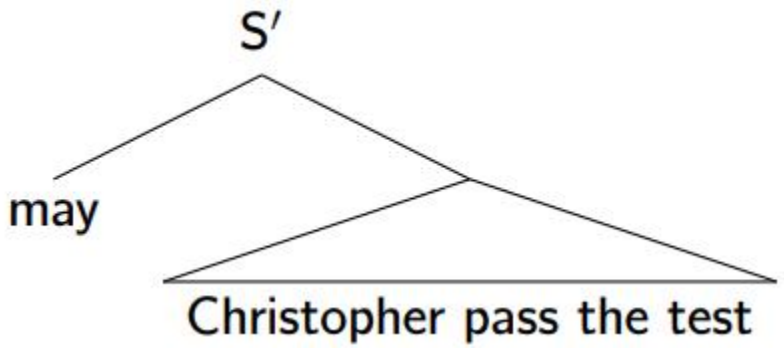
$$[\![\textbf{may}]\!]^w = \lambda p \in D_{\langle s,t\rangle} \; . \; \exists w'[w\mathcal{R}w' \wedge p(w') = 1]$$

Which LF?

(1) a. Christopher may pass the test.

b. Possibly, Christopher passes the test.

The parallel between modal auxiliaries and adverbs allows us to have a simpler LF.



However, such a LF is problematic.

Different Flavors of Modality

(2) Chris must be home at 11PM.

Context a: Chris's mom said to Chirs before he leaves for a party

Deontic reading:

$$[\![\textbf{must}]\!]^w = \lambda p \in D_{\langle s,t\rangle} \ . \ \forall w'[w' \text{ is compatible with the rules in } w \rightarrow p(w') = 1]$$

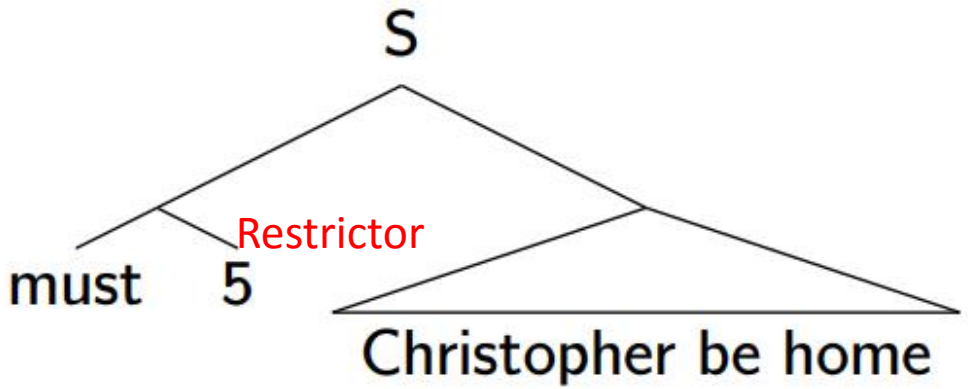
Context b: Discussing when Chris will be home.

Epistemic reading:

$$[\![\textbf{must}]\!]^w = \lambda p_{\langle s,t\rangle} \ . \ \forall w'[w' \text{ is compatible with the evidence in } w \rightarrow p(w') = 1]$$

.....

Context dependency via free variable



With the help of assigment, the free variable can receive a value from the utterance context. It functions as the quantifier's restrictor to denote different sets of possible worlds under different contexts.

The restrictor has the type <s,<s,t>>.

$$[\![\text{must}]\!]^w = [\![\text{be required}]\!]^w = [\![\text{have to}]\!]^w = \ldots$$
$$= \lambda R \in D_{\langle s,\langle s,t\rangle\rangle} \,.\, [\lambda p \in D_{\langle s,t\rangle} \,.\, \forall w'[R(w)(w') = 1 \rightarrow p(w') = 1]$$

Why type <s,<s,t>>?

Don't forget, for the sake of contingency, we need to include the evaluation world w.

(3) You must be quiet (according to the WG rule). Deontic reading
w_1: The WG rule says, no noise after 11pm.
w_2:The WG rule says, no noise after 9pm.

$[[R]]^{w,g}$ denotes a function: for any world w. {w': the house rules that are in force in w are obeyed in w'}

[[R]] (w1) = {w': Nobody makes noise after 11pm in w'}
[[R]] (w2) = {w': Nobody makes noise after 9pm in w'}

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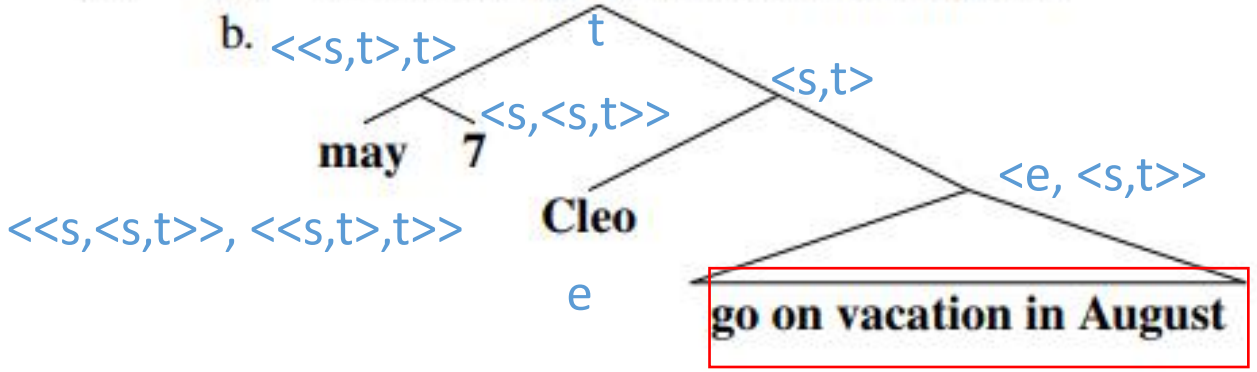
Exercise 1

Exercise 1 Compute the truth-conditions for (1a) assuming the structure in (1b). Assume that **go on vacation in August** is a lexical unit.

(1) a. **Cleo may go on vacation in August.**

b.



No need to compute in detail

Note: Your results of the derivation, i.e. the truth-conditions, should contain the free variable under assignment g. Because the interpretation of (1) is context-dependent.

Exercise 2

Exercise 2 Give first an example for the relation denoted by **7** in (1b) yielding an epistemic reading for (1a), and then one yielding a deontic reading. Describe a world w_1 where your epistemic reading for (1a) is true when uttered by someone. Can the utterance of your deontic reading be false in world w_1? Then try to describe a world w_2 where (1a) when uttered on your deontic reading is true. Again, can (1a) be false on the epistemic reading in w_2?.

Is it possible for two different readings to be true in the same world?

Exercise 3

Exercise 3 Consider (2). What would be a lexical entry for **be happy** and why? Think about what kind of accessibility relation would be suitable here.

(2) **Tony is happy that Paulie is stupid.**

Two things to think about?

1. reflexive/ veridical? factive?

2. be happy, glad, wish, want..... What do they have in common?

Thanks and see you next week!