Exercises due on: Tuesday, June 6, 10 AM (before class)

Semantic Theory 2017: Exercise sheet 5

Exercise 1

Sentence (1) is syntactically ambiguous between the two readings indicated in (1a) and (1b), due to the notorious "modifier attachment ambiguity". The syntactic ambiguity induces a semantic ambiguity.

(1) Frank Underwood called a senator in Washington DC.

   a. [S [S [S Frank Underwood [VP call- [NP a senator]]] [PP in Washington DC]] PAST]

   b. [S [S Frank Underwood [VP call- [NP a [N' senator [PP in Washington DC]]]]] PAST]

a. Give informal paraphrases of the two readings. Represent the readings of the formulas as predicate-logic formulas, using an event-semantic analysis of the verb call (type: $\langle e, \langle e, \langle e, t\rangle\rangle\rangle$).

b. Derive semantic representations for (1a) and (1b) compositionally, and simplify using beta-reduction. Assume the following translations for the lexical expressions in (1):

   - Frank Underwood $\mapsto f' :: e$
   - Washington DC $\mapsto w' :: e$
   - call- $\mapsto \lambda Q \lambda x \lambda e[Q(\lambda y.\text{call*}(y)(x)(e))] :: \langle\langle\langle e, t\rangle, t\rangle, \langle e, \langle e, t\rangle\rangle\rangle$
   - senator $\mapsto s' :: \langle e, t\rangle$
   - in $\mapsto \lambda z \lambda F \lambda v[\text{in'}(z)(v) \wedge F(v)] :: \langle e, \langle\langle e, t\rangle, \langle e, t\rangle\rangle\rangle$
   - PAST $\mapsto \lambda E[\exists e(E(e) \wedge e < e_u)] :: \langle\langle e, t\rangle, t\rangle$

For simplicity, we assume that the subject of "call" and the internal argument of the preposition are type e expressions (denoting standard objects). The indefinite article is translated as usual. The λ-variables F and v in the translation of the preposition are of the general kind, ranging over standard predicates/entities as well as event predicates/entities.

Exercise 2

In class we have seen that we can extend models containing event structure with the notion of time. This can be done by extending the model structures with an asymmetrical relation over events (representing temporal precedence), and incorporating a constant representing the utterance event; the resulting model structure is shown below:

$M = \langle U, E, <, e_u, V \rangle$, with:

- $U \cap E = \emptyset$
- $< \subseteq E \times E$ is an asymmetric relation (temporal precedence)
- $e_u \in E$ is the utterance event
- V is an interpretation function like in standard FOL

One of the limitations of this model is that it does not formally capture the duration of events, which means that it cannot formalize the temporal event structure represented in the following sentence:

(2) Although Claire started running shortly after Frank, she ran twice as long.

Try to come up with a model structure that can formalize the temporal structure of sentence (2). Provide the formal details of the model, as well as the formula representing the meaning of sentence (2). What are the limitations of your model?