„Semantic Theory“ SS 06 Exercise 3 (09/05/2006)

http://www.coli.uni-saarland.de/courses/semantics-06/

---

1 Semantics construction

Construct semantic representations for each of the following sentences, as in the previous exercise. You may use type theory and modal and tense operators as needed. Feel free to mix the modal operators with lambda abstraction and other higher-order aspects of type theory (although we haven't defined this in the lecture). β-reduce your results (including intermediate representations) as far as possible. Try to obtain representations that spell out the meaning as explicitly as possible.

(a) John reads every book.

(b) Every unmarried man is-happy.

(c) Every [$_{N'}$ student [$_{RC}$ who studies-hard]] will pass-the-exam.
(It may be helpful to think about the final β-reduced semantic representation first, and then to work backwards to get representations for "who" and "will".)

(d) Unbeatable football-teams always win.
(The noun phrase "unbeatable football-teams" is a *bare plural NP*, which has no overt determiner. Assume it has a determiner ϵ, which is an empty word with the same meaning as "all".)

2 Prepositional phrases

In sentences like the following, prepositional phrases act as intersective noun modifiers in a similar way to intersective adjectives:

(1) Every [$_{N'}$ student [$_{PP}$ at [$_{NP}$ a university]]] is-intelligent.

Find a suitable semantic representation for the preposition "at" in this sentence that is consistent with our analysis of noun phrases. Use your representation to construct a semantic representation for (1), and β-reduce it as usual. *Hint:* Compare the way in which the preposition connects two noun phrases with the way that a transitive verb does it.

3 Tense logic

(a) A formula in tense logic is called *valid* iff it is true in all model structures at all time points. Prove that each of the following formulas is a valid formula of tense logic.

  (a) $\mathbf{FF}A \rightarrow \mathbf{F}A$

  (b) $\mathbf{PP}A \rightarrow \mathbf{P}A$

  (c) $\mathbf{FP}A \rightarrow \mathbf{P}A \vee A \vee \mathbf{F}A$

(b) For each of the three formulas, give a countermodel that shows that the reversed formula (e.g. $\mathbf{F}A \to \mathbf{FF}A$) is not valid.

(c) * For each of the three formulas, specify how the "earlier than" relation has to be restricted to make the reversed formula valid. Do not impose any restrictions on the valuation V.

4 Predicate logic with tense and modality

Consider the following model structure for predicate logic with modal and tense operators. The order on the time points is $t_1 < t_2 < t_3$, and the universe is $U = \{a, b, c\}$.

S	t_1	t_2	t_3
w_1	$\{a, b\}$	$\{a, c\}$	$\{b, c\}$
w_2	$\{a, b, c\}$	$\{a\}$	$\{a, b\}$

Determine the truth values of the following formulas at w_1 and t_2:

(a) $\forall x.S(x)$

(b) $\mathbf{F}\forall x.S(x)$

(c) $\diamond\mathbf{P}\forall x.S(x)$

(d) $\mathbf{G} \diamond \forall x.S(x)$

To be turned in by 16/05/2005, 11:15 am