Semantic Theory 2014 – Exercise sheet 4

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Exercises are due on Tuesday, May 20, 10:15 a.m.

3.1 Semantics of lambda expressions

Give an explicit stepwise interpretation (with respect to M and g) of

$\lambda F[F(\text{m}^*)](\lambda x.\text{walk}(x) \vee \text{talk}(x))$

using the interpretation rules for Type Theory/ Typed Lambda Calculus. Please, no equivalence transformations or conversions, just interpretation!

3.2 Lambda expressions as lexical entries

Translate the following English words into lambda expressions:

(a) *blond* (type ⟨et, et⟩; use blond* as the underlying first-order predicate; the translation should show the intersective character of the modifier)
(b) *altruist* (type ⟨e,t⟩; take Sentence (j) from Exercise Sheet 1.1 as an informal definition of the predicate)
(c) *in* (type ⟨e,⟨et, et⟩⟩; a preposition forming a PP as in *work in Saarbrücken*)
(d) *someone* (take the intended semantics from the lecture slides)
(e) *only* (type ⟨e,⟨et, t⟩⟩; to be used as in Sentence (d) from Exercise Sheet 1.1)

3.3 *and*: more lambda expressions

(a) Assume that the *and* in *Mary walks and talks* translates to a constant and'. Give the appropriate type for and', and specify the appropriate semantic interpretation V_M(and'). No lambda abstraction here!

(b) Translate *and* into a lambda expression that expresses the meaning information given in the interpretation from (a).

(c) Assume that *and* in *Mary and Bill* combines two type e expressions, and returns a noun phrase of type ⟨et, t⟩. Translate this NP-coordinating *and* into a lambda expression (which will of course be different from the one in (b).

(d) Do the same, assuming that the arguments of *and* have the standard NP type ⟨et, t⟩.

3.4 Lambda conversion

Translate the following sentences into expressions of Typed Lambda Calculus:

(a) *[Only Bill] [works in Saarbrücken]*.

(b) *Bill [is a [blond altruist]]*.

(c) *Mary [walks [and talks]]*.

(d) *[John [and Mary]] walk.*

(e) *[John [and Mary]] [walk [and talk]]*

Use the translations for *only, blond, altruist, in* from 3.2 and for the two variants of *and* from 3.3 (b) and (d). In addition, use the following lexical entries:

Bill ➔ $\lambda F.F(b^*)$: $\langle et, t \rangle$ *Mary* ➔ $\lambda F.F(m^*)$: $\langle et, t \rangle$

Saarbrücken ➔ sb*: e *work, walk, talk* ➔ work', walk', talk': $\langle e, t \rangle$

is-a ➔ $\lambda F.F$

Move along the syntactic structure indicated by the brackets, use function application and (multiple) lambda conversion, to arrive at the simplest possible expressions.

Hint: Use different variables for all lexical expression in a sentence (this is to avoid a variable conflict, which we will talk about next week). Download a new version of the Lecture 6 slides. I have added an example slide for lambda conversion.