Exercises due on: Tuesday, May 14th, 10 AM (before class)

Semantic Theory 2019: Exercise sheet 3

Exercise 1

Give an explicit stepwise interpretation (with respect to M and g) of the following lambda expression using the interpretation rules for Type Theory and Typed Lambda Calculus. Do not use any equivalence transformations or conversions. Describe the resulting interpretation in words.

$$\lambda F(F(m'))(\lambda x.walk(x) \vee talk(x))$$

Exercise 2

2.1 Translate the following English words into lambda expressions:

a. blond$_{\langle\langle e,t\rangle,\langle e,t\rangle\rangle}$ (use blond* as the underlying first-order predicate; the translation should show the intersective character of the modifier explained in the lecture slides of week 4)

b. on$_{\langle e,\langle\langle e,t\rangle,\langle e,t\rangle\rangle\rangle}$ (As in the sentence: "Padmé lives <u>on</u> Naboo")

c. only$_{\langle e,\langle\langle e,t\rangle,t\rangle\rangle}$ (As in the sentence: "<u>Only</u> Luke defeated Darth Vader")

2.2 Translate the following sentences into expressions of Typed Lambda Calculus, assuming the syntactic structure indicated by the brackets. Use function application and lambda conversions to arrive at the simplest possible expressions.

a. Padmé lives [on Naboo].

b. [Only Luke] [is a [blond Jedi]].

c. [Luke [and Darth Vader]] fight.

Use the translations for *blond*, *on*, and *only* from exercise 3.1. In addition, use the following lexical entries:

- Padmé$_e$, Naboo$_e$, Luke$_e$, Darth Vader$_e$ $\mapsto$ p', n', l', d'
- live$_{\langle e,t\rangle}$, Jedi$_{\langle e,t\rangle}$, fight$_{\langle e,t\rangle}$ $\mapsto$ live', jedi', fight'
- is-a$_{\langle\langle e,t\rangle,\langle e,t\rangle\rangle}$ $\mapsto$ $\lambda F.F$
- and$_{\langle e,\langle e,\langle\langle e,t\rangle,t\rangle\rangle\rangle}$ $\mapsto$ $\lambda x.\lambda y.\lambda P(P(x) \wedge P(y))$