Foundations of Semantics and Pragmatics - Homework 2

Please submit answers to the following exercises on paper to the course pigeon hole, not later than 29.11.2012. You can discuss the exercises with other students, but your work must be personal. If you have questions, please contact Assaf at least one day before the deadline.

1 Types

A Give the types corresponding to the following descriptions:
1. functions from entities to functions from entities to truth values
2. functions from functions from entities to entities to functions from entities to truth values
3. functions from functions from entities to truth values to functions from truth values to entities
4. functions from entities to functions from functions from entities to truth values to functions from truth values to entities
5. functions from functions from functions from truth values to entities to functions from entities to entities to functions from entities to functions from entities to truth values

B Give descriptions for the following types. To use less parentheses we are using a common convention about writing down types, i.e. that grouping of types associates to the right. This means that a type like $e(tt)$ will be written as $ett$, while the parentheses in $(et)e$ cannot be removed. As another example consider $(e(e(et)))t$ which will be written as $(eeet)t$.
1. $e(ett)t$
2. $(ee)(tt)t$
3. $tte$
4. $(et)et$
5. $((tt)ee)(tt)te$

C For each of the following pairs of types say if function application can be applied and if so determine the type of the application:
1. $eet ; e$
2. $(et)t ; et$
3. $(ee)tt ; tt$
4. $(ee)(tt) ; tt$
5. $ett ; et$
6. $e(et)et ; eet$
7. $(eet)et ; ee$
8. $e(et)t ; (e(et)t)t$
9. $e(et)et ; e(et)$
10. $(ee)tet ; (ee)te$
2 Domains

A Let \( D_e = \{a, b\} \). Write down all the members of \( D_{ee} \) and \( D_{(ee)(tt)} \).

B Write down the characteristic function for the following denotations, given as a set or relation. You may write the characteristic function using \( a \rightarrow b \) instead of \( \langle a, b \rangle \). For example, the characteristic function of the set \( B = \{\text{barack}\} \) is written as:

\[
\begin{align*}
\text{barack} & \rightarrow 1, \\
\text{george} & \rightarrow 0, \\
\text{bill} & \rightarrow 0
\end{align*}
\]

Take \( D_e = \{\text{barack, george, bill}\} \)

(a) Denotation of the noun \textit{president}, \( P = \{\text{barack, bill}\} \)

(b) Denotation of the verb \textit{introduce} (read \( \langle x, y, z \rangle \in \text{Int} \) as “\( x \) introduces \( y \) to \( z \)” ),

\[
\text{Int} = \begin{cases}
(\text{barack, bill, george}), \\
(\text{george, barack, bill}), \\
(\text{bill, george, barack}),
\end{cases}
\]

(c) Which type would you assign to \textit{president} and \textit{introduce}?

3 General Question

Consider the following sentences and answer the questions written below:

- Tina ran
- Tina ran quickly
- Tina is not a president

1. Write the types for the underlined words. Make the following assumptions:
   - Tina is of type \( e \)
   - \( is \) and \( a \) denote identity functions of type \( (et)(et) \).

2. According to your answers, write the type of \textit{very} in the following sentence:
   - Tina ran [very quickly]

3. Consider the following unidirectional entailment:
   - Tina ran very quickly \( \rightarrow \) Tina ran quickly

   What are the restrictions on the denotation of \textit{very} that license this entailment? Write the restrictions and explain.
4 Types

In figure 1 below we have left two types in the structure unspecified as X and Y. Give two possible ways to substitute X and Y so that function application can go on safely. Can you think of the relevance of this puzzle?

Figure 1: fill in X and Y