Exercices

Consider the following abstract syntax together with its associated Montague-like semantics:

\[
\begin{align*}
\text{ALICE} & : \text{np} \\
\text{SOMEONE} & : \text{np} \\
\text{LEFT} & : \text{np} \rightarrow s \\
\text{THINK} & : \text{cc} \rightarrow \text{np} \rightarrow s \\
\text{THAT} & : (\text{np} \rightarrow s) \rightarrow (\text{np} \rightarrow \text{cc})
\end{align*}
\]

\[
\begin{align*}
\llbracket \text{ALICE} \rrbracket & = \lambda P. P \text{alice} \\
\llbracket \text{SOMEONE} \rrbracket & = \lambda P. \exists x. P x \\
\llbracket \text{LEFT} \rrbracket & = \lambda S. S (\lambda x. \text{left} x) \\
\llbracket \text{THINK} \rrbracket & = \lambda C. \lambda S. S (\lambda x. C (\text{think} x)) \\
\llbracket \text{THAT} \rrbracket & = \lambda P. \lambda s. \lambda f. P (\lambda p. s (\lambda x. f (p x)))
\end{align*}
\]

where:

\[
\begin{align*}
\text{alice} & : \iota \\
\text{left} & : \iota \rightarrow o \\
\text{think} & : \iota \rightarrow (o \rightarrow o)
\end{align*}
\]

1. Compute the semantic representation of the sentence Alice thinks that someone left, whose abstract syntax is given by the following term:

\[
\text{THINK (THAT LEFT SOMEONE) ALICE}
\]

2. The syntactic category assigned to the complement clause that someone left is cc. What is the corresponding semantic category?

3. The semantic recipe assigned to THINK induces the de re reading. Give an alternative recipe that leads to the de dicto reading.

4. Consider the three following sentences:

\[
\begin{align*}
\text{Alice thinks that every man is mortal} & \quad (1) \\
\text{Alice thinks that Socrates is a man} & \quad (2) \\
\text{Alice thinks that Socrates is mortal} & \quad (3)
\end{align*}
\]

Give a postulate on the modality think that would allow (3) to be inferred from (1) and (2).

5. Does the postulate you have given allow you to infer Someone thinks that Socrates is mortal from Someone thinks that every man is mortal and Someone thinks that Socrates is a man? Discuss.
Solutions

1. $\text{[THINK (THAT LEFT SOMEONE) ALICE]} \rightarrow_{\beta} \exists x. \text{think alice (left } x)\text{)}$

2. $(o \rightarrow o) \rightarrow o$

3. $\text{[THINK_{dicto}]} = \lambda C. \lambda S. S (\lambda x. \text{think } x (C (\lambda y. y)))$

4. $\forall ab. \forall x. (\text{think } x (a \rightarrow b)) \rightarrow (\text{think } x a) \rightarrow (\text{think } x b)$

5. No. What we would need to infer that Someone thinks that Socrates is mortal is that Someone thinks that every man is mortal and that Socrates is a man. But we cannot infer this from the facts that Someone thinks that every man is mortal and that Someone thinks that Socrates is a man. Indeed, there might be two different persons.