Semantic Theory 2012, Exercise 7

1 Basic DRT

Consider the following text T1:

Mary knows a professor. He recommends a book. She reads it.

(a) Derive a DRS K1 for the text T1 using the DRS construction algorithm from the lecture. You don't have to spell out every single step of the derivation, but do show some of them.

(b) Determine the truth conditions of K1: As a prerequisite, compute the conditions for a verifying embedding. Make use of the equations to simplify!

(c) Although the text T1 introduces several discourse referents that are available for anaphoric reference, the pronouns can't refer to all antecedents due to their gender. Specify this restriction informally. Then show how it can be incorporated into the DRS representations and construction rules.

2 Complex Conditions

Consider the following text T2:

Mary knows a professor. If he writes a book, she doesn't read it.

(a) Derive a DRS K2 for the text T2 using the DRS construction algorithm. You don't have to spell out every single step of the derivation, but do show some of them.

(b) Interpret K2, simplify as much as possible, and give the truth conditions.

(c) Try to express the truth conditions (as requirements towards the model structure) in natural language as simply as possible.

(d) Translate K2 into a formula of first-order predicate logic, using the translation function from the slides.

3 Free Discourse Referents

Consider the DRSs K3 and K4 for (one-sentence) texts T3 and T4, respectively.

T3 : *There is a book which Peter does not own*.

K3 : ({x, y}, {x=Peter, book(y), ¬(∅, {own(x, y) })})

T4: *Peter does not own every book.*

K4 : ({x}, {x=Peter, ¬(∅, {({y}, {book(y)}) ⇒ (∅, {own(x, y)})})})

(a) Determine the truth conditions for the two DRSs and compare them. Note: To determine the relation between the truth conditions, you need a bit of general mathematical reasoning.

(b) If the two texts are continued by “He buys it,” DRS construction gives us DRSs K3+ as extension of K3.

K3+ : ({x,y,u,v}, {x=Peter, book(y), ¬(∅, {own(x, y)}), u=x, v=y, buy(u,v)})

According to accessibility constraints, DRS K4 cannot be extended because we do not find an appropriate antecedent for one of the pronouns. Explain!

(c) If we ignore accessibility restrictions, we could obtain obtain K4+ as a result of extending K4 with “He buys it”.

K4+: ({x}, {x=Peter, ¬(∅, {({y}, {book(y)}) ⇒ (∅, {own(x, y)})}), u=x, v=y, buy(u,v) })

In one respect, K4+ is essentially different from K3+. Which?

(d) Compute the conditions under which an embedding f verifies K3+ and K4+, and try to determine the truth conditions of the two DRSs. Are there any problems?

4 Mathematical Texts

Consider the following text T3, which is a theorem of elementary geometry:

Given a line g1 and a line g2, let p be a common point of g1 and g2. Then there is a line k which is orthogonal neither to g1 nor g2, and which doesn’t go through p.

(e) Give a DRS K3, which represents the semantic structure of T3. You can write down K3 directly; it doesn’t have to be generated by applying a construction algorithm. Analyse “line” as one-place, “orthogonal to” and “go through” as two-place, and “common point of” as three-place predicates. “Given” and “let” are cues for the discourse structure and don’t occur in the DRS as predicates.

(f) Try to extend the syntax and the DRS construction rules with rules for NPs like “a line g1” and anaphora like “g1”. How could the DRS construction algorithm be modified to analyze texts with such NPs?