Semantics C
Kamp and Reyle
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May 7 2010
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From Discourse to Logic
Kamp and Reyle 1993
Chapters 1 and 2

The Data

• DRT gives an analysis for tracking entities in a conversation, to do this they use discourse referents.

By referring to DISCOURSE REFERENTS, rather than actual referents we can account for the following data:

• Multiple discourse referents can link to a single referent.

• Donkey anaphora.

• John doesn't have a puppy. *It has spots.

1 Overview

The aim of this theory is to capture how discourses are interpreted. The process that Kamp and Reyle propose has three steps, outlined below.

Natural Language → DRS → interpretation

◦ To get from Natural Language to the DRS, they use Construction Rules.

◦ To get from the DRS to an interpretation, they use interpretation rules.

- A sentence (syntactic structure) is added to the DRS. Construction rules (CR) are used to break down the tree, top down, extracting information in the format of conditions.

Discourse referents
Conditions

- Conditions are interpreted by Interpretation Rules to yield the truth conditions of a given DRS.
  - ◦ A DRS is interpreted with respect to a model and an assignment function.

2 Truth

◦ Truth is defined as the existence of a function that maps drefs to entities in a model such that all conditions are satisfied.

◦ This is analogous to the satisfaction sequences of Heim's File Change Semantics.

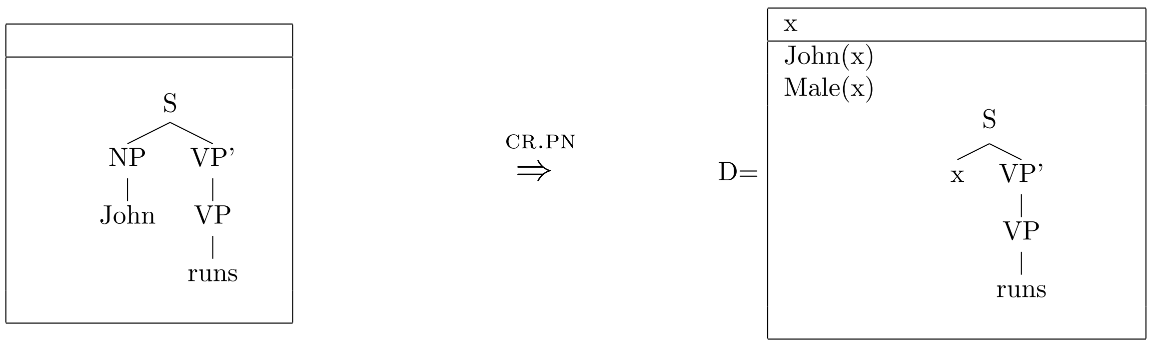
3 Noun Phrases

Lets now look at the Construction and interpretation rules for Noun phrases.

- Proper Names

  ◦ Construction rule: a new discourse referent is introduced and both the gender and the name are predicated of this new dref. Proper Names will always enter into the matrix DRS (this will be discussed more in section five).

  (1) John runs.

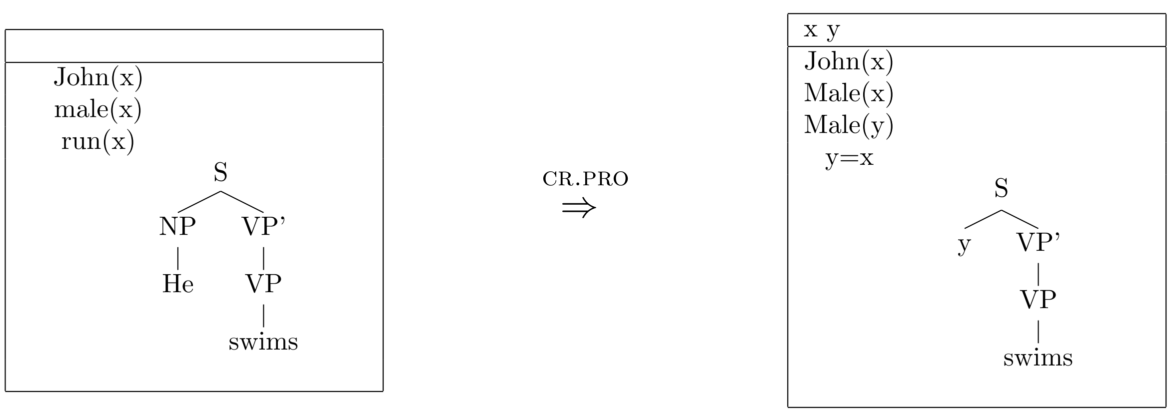


  ◦ Interpretation Rule: D[1] is true with respect to M_1 and F iff $F(x) \in male_{M1}$ and $F(x) \in John_{M1}$ and $F(x) \in run_{M1}$

- Pronouns

  ◦ Construction rule: a new discourse referent is introduced and the gender of the pronoun is predicated of the new dref. The new dref is also set equal to an old (accessible) dref that satisfies its gender condition.

  (2) He swims.



  ◦ Interpretation rule: For a pronoun condition to be true, the function must assign the same denotation to the two drefs–$F(y) = F(x)$.

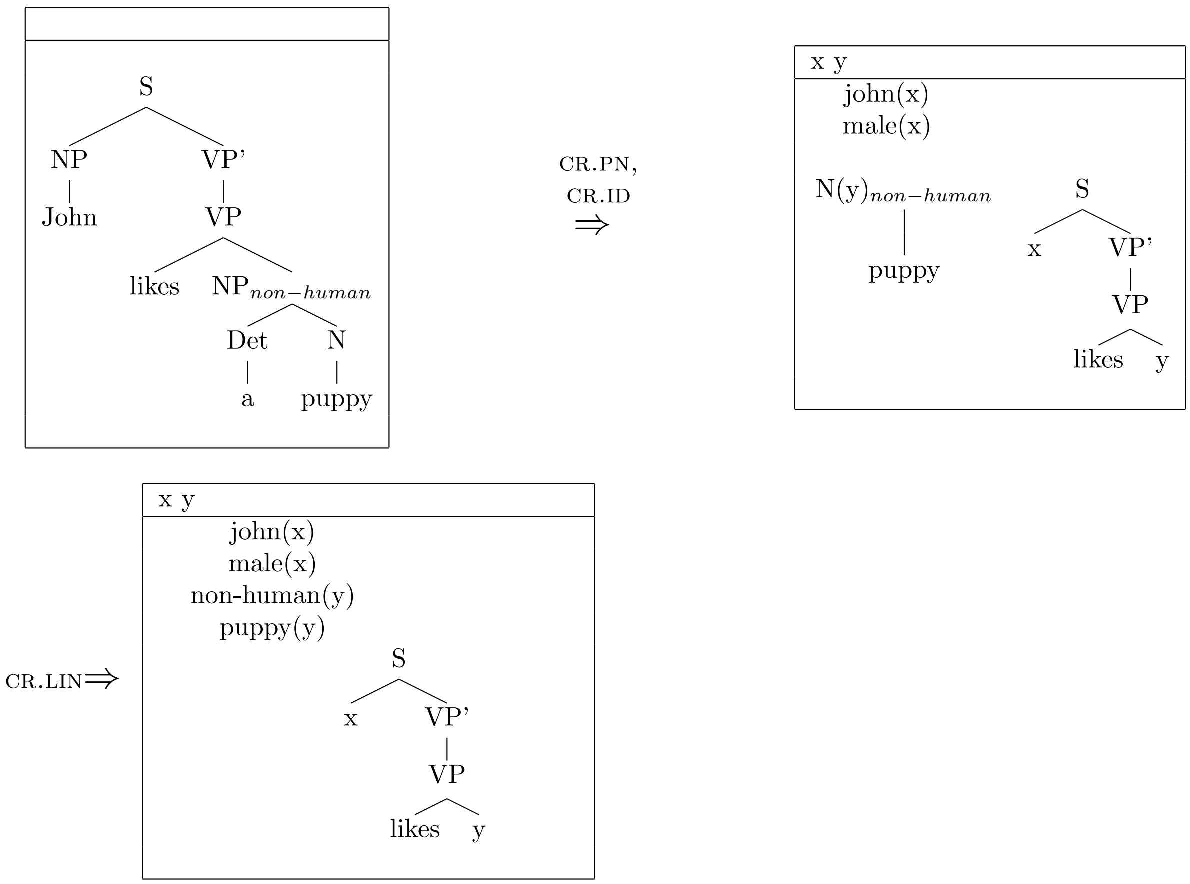
[1]The DRS D is still reducible.

- Indefinite Descriptions

  ◦ Indefinite descriptions introduce a new discourse referent. The determiner is dropped and the description is predicated of the new dref.

  ◦ This is captured in two construction rules, cr.id and cr.lin.

  (3) John likes a puppy.



4 Subordinate DRSs

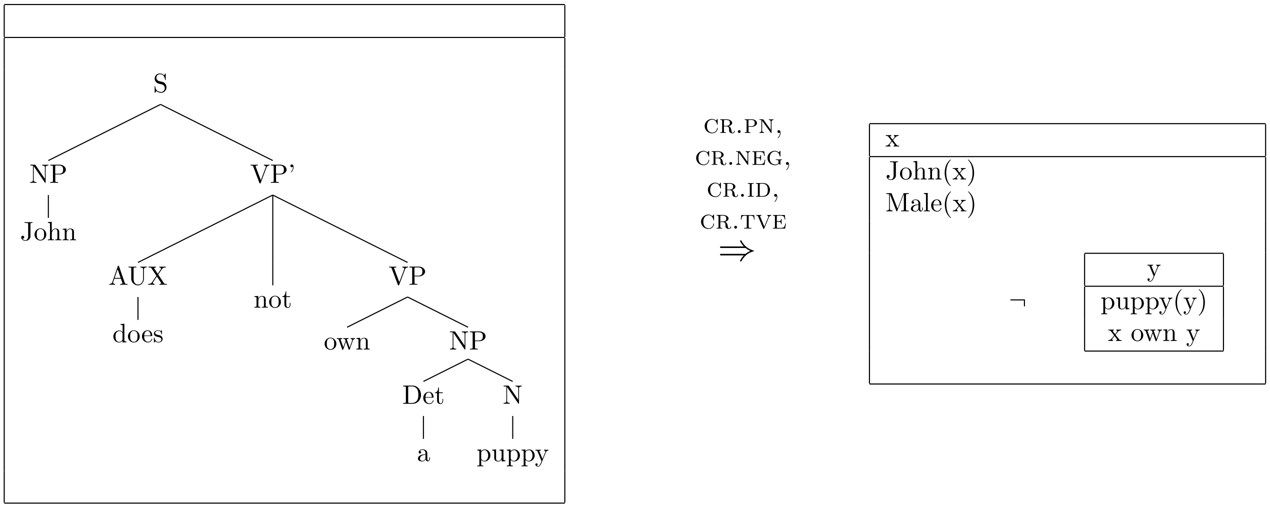
The subordination relation is represented with nested boxes. These nested boxes represent a possible world that we can perform operations on, such as negation or the conditional. In Heim's File Change Semantics, these were called auxiliary files.

4.1 Negation

For negation, we introduce a possible situation/world and negate it.

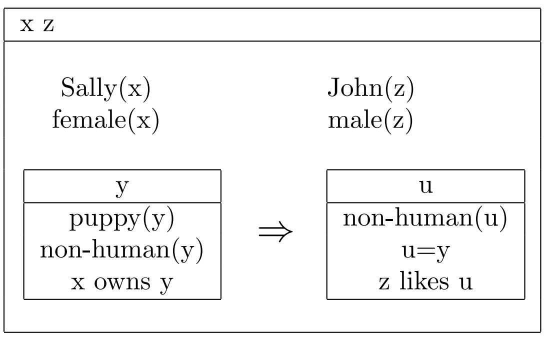
(4) John does not own a puppy.

◦ Interpretation rule: Conditions in a negated nested box are true iff there is no function such that all conditions are satisfied.



4.2 Conditional

(5) If Sally owns a puppy, then John likes it.



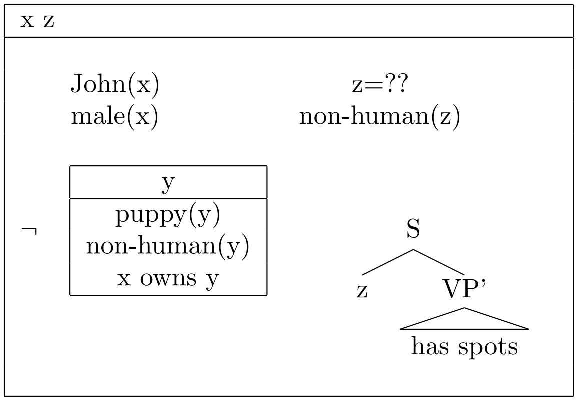
5 Accessibility and Extending functions

◦ These nested boxes can do a lot of work for us and yield some pretty cool predictions that hold in natural language.

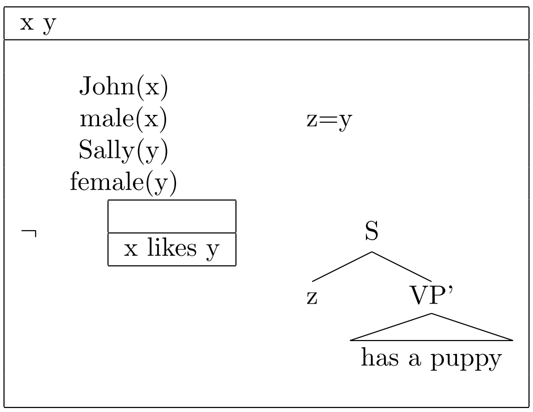
5.1 Accessibility

As stated above, proper names under negation float up to the matrix DRS, but pronouns and indefinites do not. We can see evidence for this in the difference between (6) and (7).

(6) John does not own a puppy. ?? It has spots.



(7) John doesn't like Sally. She has a puppy.



• When more discourse is added to a conversation, it is added to the main DRS. Therefore it only has access to the drefs in the main DRS.

◦ In (6) the indefinite 'a puppy' is introduced under negation. Therefore its discourse referent is not accessible to further utterances.

◦ A dref α is accessible in a DRS D from a condition in a DRS D' iff D' is subordinated to D.

◦ Conditions in the antecedent of a conditional are accessible from the consequent DRS.

(8) If John has a puppy, Mary likes it. ?? It has spots and a fluffy tail.

5.2 Extending Functions

◦ Now that we have multiple nested DRSs, we will also have multiple extending functions. We need this as we do not want a function of the matrix DRS to assign values to those drefs which are not accessible to it.

◦ A function F' that extends F will agree with F on all drefs that are accessible to both functions. It will only differ with respect to those drefs which are accessible to F' but not F.

◦ The domain of the universe will stay the same for both functions. The domain of the functions is minimally extended to include those drefs that have been introduced in the subordinate DRS.

5.3 How the two are the same

Those drefs which are accessible by a DRS are those which the function will assign values to. This intuition is strong, yet is not captured by this theory.

6 In action

Discourse:

(9) Sally likes John. If he has a puppy, then she likes it (too).

$$
D=\begin{array}{|c|}
\hline
x\ y \\
\hline
\begin{array}{ll}
\text{x like y} & \\
\text{Sally(x)} & \text{John(y)} \\
\text{female(x)} & \text{male(y)}
\end{array} \\
\begin{array}{|c|}\hline z \\ \hline \text{puppy(z)} \\ \text{non-human(z)} \\ \text{y has z} \\ \hline \end{array} \Rightarrow \begin{array}{|c|}\hline u\ w \\ \hline \text{female(u)} \\ u{=}x \\ \text{non-human(w)} \\ z{=}w \\ \text{u likes w} \\ \hline \end{array} \\
\hline
\end{array}
$$

The DRS D is true iff

there is an F from {x,y} to U_m such that

$F(x) \in \text{Sally}_{M1}$
$F(x) \in \text{female}_{M1}$
$F(y) \in \text{John}_{M1}$
$F(y) \in \text{male}_{M1}$
$\langle F(x), F(y) \rangle \in \text{like}_{M1}$

and for every F' extending F such that
F(x)=F'(x)
F(y)=F'(y)
and
$F'(z) \in \text{puppy}_{M1}$
$F'(z) \in \text{non-human}_{M1}$
$\langle F'(y), F'(z) \rangle \in \text{has}_{M1}$

there is an F" extending F' such that F"(x)=F'(x)
F"(y)=F'(y)
F"(z)=F'(z)
and
$F''(u) \in \text{female}_{M1}$
F"(u) = F"(x)
$F''(w) \in \text{non-human}_{M1}$
F"(z) = F"(w)
$\langle F'(u), F'(w) \rangle \in \text{like}_{M1}$