Discourse
BSc Artificial Intelligence, Spring 2011

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Plan for Today

- Presupposition accommodation
- Exercises with the DRT version of Curt
- Possibly time for individual discussions on your final projects.

Presupposition: summary from last week (1)

A presupposition is background information that is taken for granted:

- it is triggered by a specific word or construction;
- it will remain a necessary assumption even under negation;
- it is defeasible, i.e. it can be cancelled.

Mary 's dog was killed in an accident
$\models$ Mary's dog is dead
$\rightsquigarrow$ Mary had a dog

Mary 's dog was not killed in an accident
$\not\models$ Mary's dog is dead
$\rightsquigarrow$ Mary had a dog

Marta's dog was not killed in an accident, because in fact she never had a dog.
$\not\rightsquigarrow$ Mar had a dog

Several types of expressions are presupposition triggers: proper nouns, possessives, definite NPs, factive verbs, iteratives. . .

The presupposition projection problem: if a complex sentence contains presupposition triggers, are the presuppositions inherited by the complex sentence?

Presupposition: summary from last week (2)

According to van der Sandt's DRT-based approach, presuppositions are akin to anaphoric expressions such as pronouns. However:

- unlike pronouns, they are represented as DRSs;
- unlike pronouns, they can not only be resolved via binding (when a suitable antecedent is found) but also via accommodation.
- accommodation can take place when presuppositions contribute new information that is compatible with the current context.

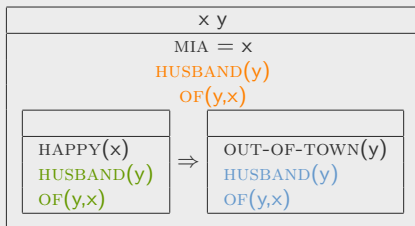Vincent informed his boss. The man was shocked.
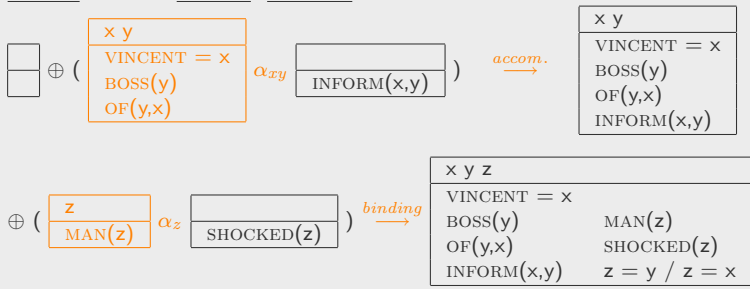
Types of Accommodation

The structure of DRSs allows for different types of accommodation:

- **Global**: the presupposed information is accommodated in the outermost DRS.
- **Local**: the presupposed information stays where it originated.
- **Intermediate**: the presupposed information is accommodated in some intermediate DRS that subordinates the DRS where the presupposition originated.

If Mia is happy, <u>her husband</u> is out of town.

$$
\begin{array}{|l|}
\hline
x\ y \\
\hline
\text{MIA} = x \\
\text{HUSBAND}(y) \\
\text{OF}(y,x) \\
\hline
\boxed{\begin{array}{l} \text{HAPPY}(x) \\ \text{HUSBAND}(y) \\ \text{OF}(y,x) \end{array}} \Rightarrow \boxed{\begin{array}{l} \text{OUT-OF-TOWN}(y) \\ \text{HUSBAND}(y) \\ \text{OF}(y,x) \end{array}} \\
\hline
\end{array}
$$

Resolution Ambiguity

The availability of two resolution mechanisms (binding and accommodation) and of different accommodation sites, can lead to a large number of potential interpretations.
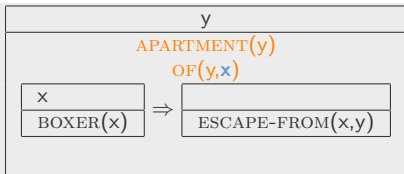
There are a number of constraints that filter out potential solutions, which can be exploited when implementing a resolution algorithm.

- **Acceptability constraints**: hard constraints that block disallowed interpretations.

- **Preference constraints**: soft constraints that establish a preference ranking among allowed interpretations.

Acceptability Constraints

- Free variable Check: accommodation should not lead to free discourse referents. In the example below, global accommodation is blocked because variable x is free in the main DRS.

Every boxer escaped from his apartment.

$$
\begin{array}{|c|}
\hline
y \\
\hline
\text{APARTMENT}(y) \\
\text{OF}(y,x) \\
\boxed{\begin{array}{|c|}\hline x \\ \hline \text{BOXER}(x) \\ \hline\end{array}} \Rightarrow \boxed{\begin{array}{|c|}\hline \\ \hline \text{ESCAPE-FROM}(x,y) \\ \hline\end{array}} \\
\hline
\end{array}
$$

In B&B's implementation of the algorithm, consistency and informativity checking are considered hard constraints.

- Consistency: a possible interpretation is allowed only if it is consistent with the preceding discourse

- Informativity: a possible interpretation is allowed only if it is informative with respect to the preceding discourse.

Preference Constraints

Among those interpretations that do not violate the acceptability constraints, some may be preferred. For instance, in general:

• binding is preferred over accommodation, and

• global accommodation is preferred over local accommodation

van der Sandt also proposes two "local" versions of informativeness and consistency:

• super-ordinate DRSs should not imply a subordinated DRS (informativity) nor a negated subordinated DRS (consistency).

If Mia is married, then <u>her husband</u> is out of town.

x y
MIA = x
HUSBAND(y)
OF(y,x)

| MARRIED(x) HUSBAND(y) OF(y,x) | ⇒ | OUT-OF-TOWN(y) HUSBAND(y) OF(y,x) |
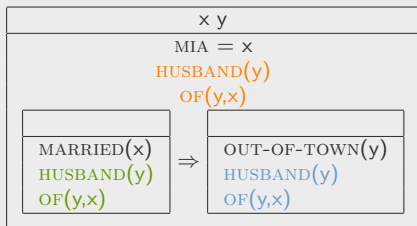
Given the background knowledge: $\forall x.\text{MARRIED}(x) \leftrightarrow \exists y \text{HUSBAND-OF}(y,x)$ in this example, global and local accommodation are dispreferred due to local informativity.

Differences among Triggers

Presupposition triggers vary in their capacity for binding and accommodation and in the types of accommodation their prefer. For instance:

- Third person pronouns normally do not allow accommodation, except for discourse initial occurrences.
- Reflexive pronouns can't be accommodated since they are intrinsically anaphoric.
- Proper names allow accommodation only on the global level.
- Definite descriptions, e.g. possessives, can accommodate on all levels.

<u>Addenda:</u> The computation of presuppositions is a hot topic in NLP. See for instance the following recent ad:
http://www.rug.nl/gradschoolHumanities/admissions/
phdPositions/PhDPositionComputationalSemantics2011

Exercises

The DRT version of the Curt system is `curtPPDRT.pl` in h BB2.
It handles pronouns and some presupposition triggers.

- you need to download the updated version of the code that runs with Prover9 and Mace4 (`updated-inference2.zip` in Blackboard/Course Materials)
- It uses a nice graphic format for DRSs (`printDRS.pl`)
- ... but it has some bugs as well: it declares sentences/discourses with possessive pronouns and the verb *'to have'* inconsistent, although it is able to build correct interpretations for them.

Enter these sentences and use the command `interpretations` after Curt's response
> the woman who snorts likes vincent.
> the woman who snorts kills her husband.

- **N.B.**: when doing the exercises, remember to use the command `new` after each discourse you are testing to clear the discourse history.

What's Next

Final session next Tuesday, 10 May: update and feedback session on working plan for final projects

- Update report on your project plan:
  - ∗ what is your project topic? what are the aims of your project? try to be as concrete as possible.
  - ∗ how do you plan to reach your aims? try to break down your work plan into tasks and subtasks.
- Feedback: please give useful feedback to your fellow class mates:
  - ∗ does the plan make sense? is it feasible? are there aspects that are not clear? any suggestions for improvement?

Final project submission deadline: Friday, 20 May, midnight.

Exam date: 23 May, 13-15h. Presentations of final projects.