

Instructional DRT

A semantic representation which reflects the syntactic structure

The main purpose of discourse is to convey information

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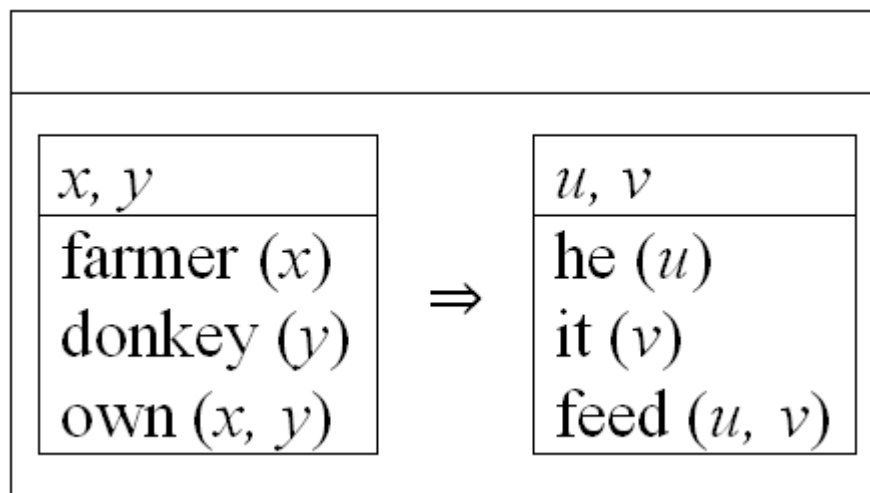
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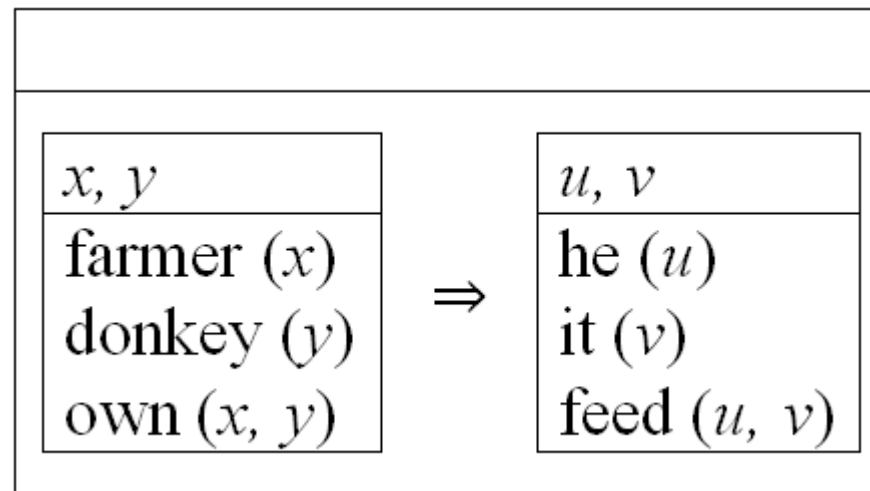
Discourse Representation Theory

- DRT is a dynamic semantic theory (Kamp 1981)
 - Employs a semantic representation called DRS
 - A DRS consists of discourse referents and conditions
 - For complex sentences, a DRS can contain sub-DRSs
- *If a farmer owns a donkey, he feeds it*



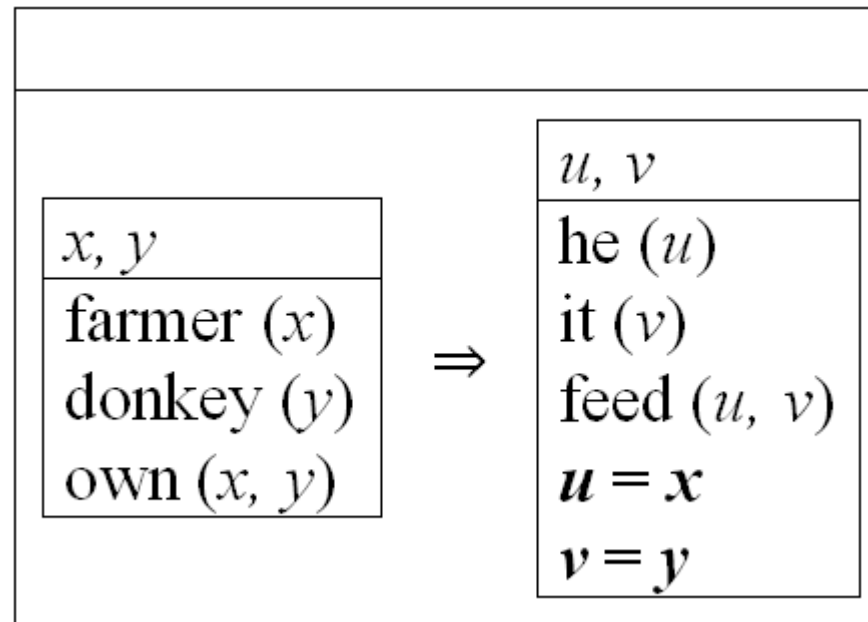
Anaphora resolution

- *If a farmer owns a donkey, he feeds it*



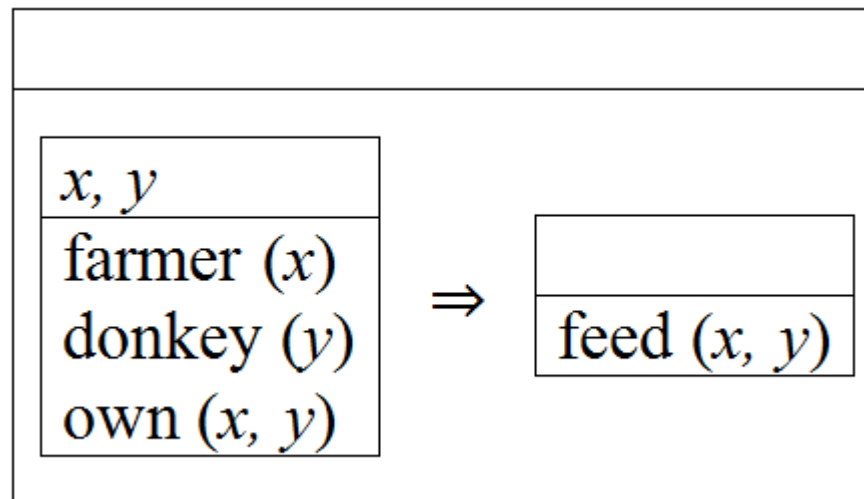
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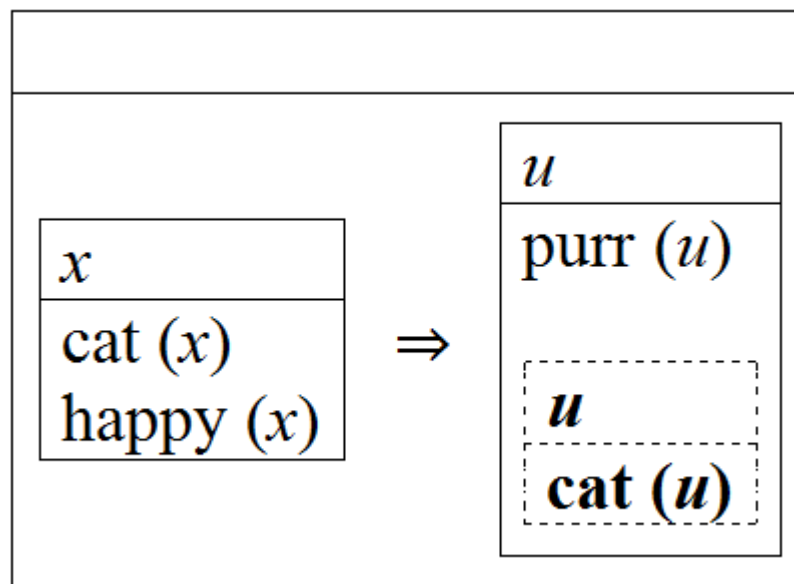
Anaphora resolution

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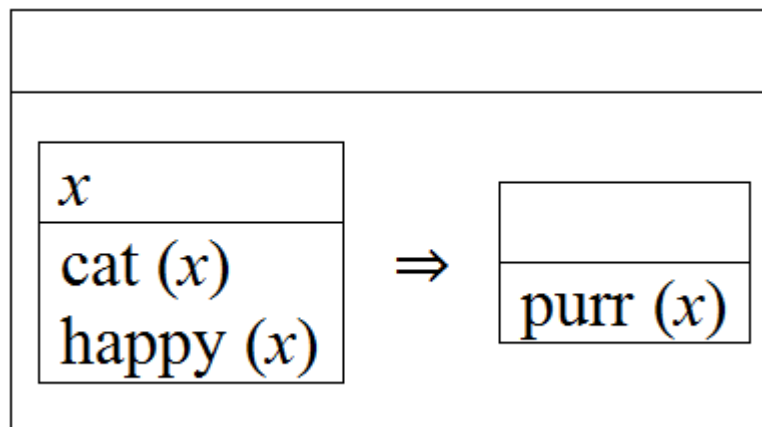
Presupposition projection

- Binding theory of presupposition (van der Sandt 1992)
 - A special sub-DRS (A-DRS) stores the presupposition content
 - A Preliminary DRS is a DRS with non-empty A-DRSs
- *If a cat is happy, **the cat** purrs*



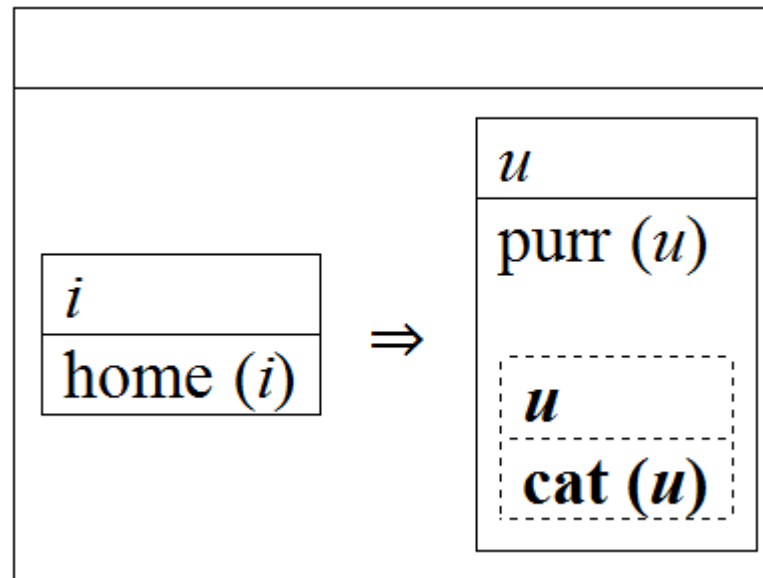
Presupposition projection

- Preliminary DRS vs Proper DRS
 - A-DRSs must be resolved – bound or accommodated higher
 - Once they are resolved, Main DRS becomes a Proper DRS
- *If a cat is happy, the cat purrs*



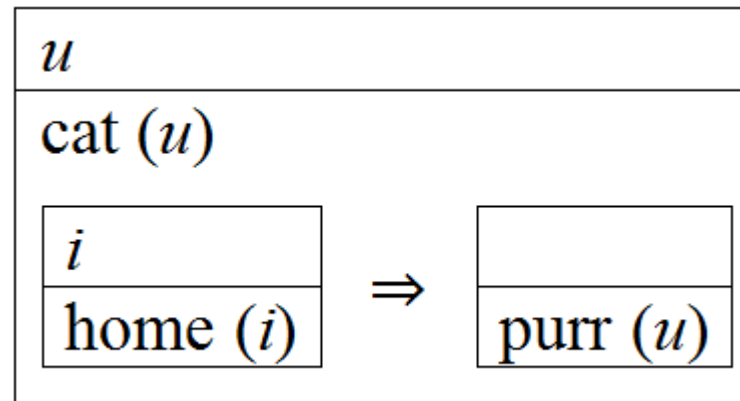
Presupposition accommodation

- Accommodation
 - If no antecedent is found, it can be added (accommodated)
 - This is a repair strategy
- *When I am at home, the cat purrs*



Presupposition accommodation

- Binding vs accommodation
 - Binding goes bottom-up
 - Accommodation goes top-down
- *When I am at home, the cat purrs*



Specific indefinites

- Specific indefinites (van Geenhoven 1998)
 - Similar to presuppositions
 - They are interpreted not in the place they appear
 - But somewhere higher in the structure
 - They are normally accommodated rather than bound
- Are they a special type of presupposition?
- *Peter intends to visit **a museum** every day*
 - *Has at least three different interpretations*
 - *Depending on the level where 'a museum' is interpreted*

Backgrounding (Geurts 2010)

- Specific indefinites are not presuppositions
 - Accommodation is a repair strategy
 - It would be strange to use it normally as specifics do
- Different types of backgrounding:
 - Presuppositions
 - Specific indefinites
 - Conventional implicatures
- The Buoyancy Principle:
 - Backgrounded material tends to float up towards the main DRS.

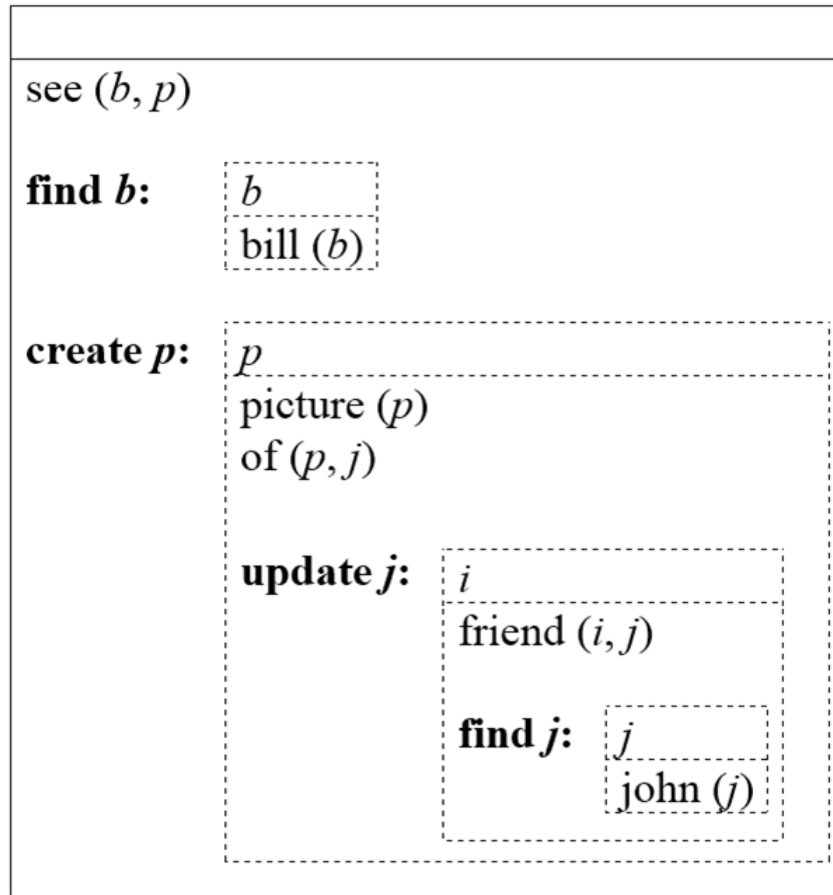
DRSs as instructions

- We can use A-DRSs for all backgrounded expressions
- But they have to be marked with their function
 - Propositional A-DRS serves to *find* a discourse referent
 - Specificity A-DRS – to *create* a new discourse referent
 - Conventional implicature A-DRS – to *update* an existing one
 - Supplied with a function and a distinguished discourse referent an A-DRS becomes an instruction for the hearer to be processed against his mental database
- Now we can call them B-DRSs (backgrounded DRS)
- Main DRS is an instruction to update the topic referent

DRSs as instructions

- *Bill saw a certain picture of John, a friend of mine*

update *b*:



<i>b</i> , <i>p</i> , <i>j</i> , <i>i</i>
bill (<i>b</i>)
see (<i>b</i> , <i>p</i>)
picture (<i>p</i>)
of (<i>p</i> , <i>j</i>)
john (<i>j</i>)
friend (<i>i</i> , <i>j</i>)

Syntax

- The structure of a Preliminary DRS:
 - Each backgrounded constituent corresponds to a B-DRS
 - B-DRS hierarchy forms a tree
 - The tree mirrors the syntactic tree of the sentence
- Sentence production
 - The speaker intends to convey information to the hearer
 - He splits his mental Proper DRS into a set of instructions to find, create or update mental referents in the hearers' mind
 - Being dependent on one another they form a tree
 - The tree is then realized as a syntactic tree of the sentence

Utterances as programs

- Two steps of NLU (Davies & Isard 1972)
 - Compilation
 - Execution
 - Understanding an utterance vs carrying it out
- In our model
 - Compiling instructions = building a Preliminary DRS
 - Executing instructions = resolving B-DRSs to obtain a Proper DRS
- A book is not a knowledge base
 - It is a script to create the knowledge base

Two layers of representation

- Preliminary DRS – sentence representation
 - A sequence of instructions
 - Is completely context-independent
 - But nevertheless is context-sensitive
 - Captures information structure (to some extent)
 - Reflects the syntactic tree in a language-independent way
 - Can serve well as an interlingua for translation
- Proper DRS – mental representation
 - Captures truth conditions
 - Has a model-theoretic interpretation

Syntactic islands

- Islands
 - Syntactic constructions which contain an element that cannot be extracted out of it
- Non-island example
 - *Bill saw [a picture of John]*
 - **Who** did Bill see [*a picture of ____*]?
- Island example
 - *Bill saw [the picture of John]*
 - ***Who** did Bill see [*the picture of ____*]?

Islands explanation

- BCI hypothesis (Erteschik-Shir 1973, Goldberg 2006)
 - Backgrounded constituents are islands
- Instructional semantics could explain why
 - Each backgrounded constituent is a separate instruction
 - It is executed separately
 - All discourse referents it depends on must have already been found or created by other instructions
 - If that is not the case (e. g. there are vicious circles in the instruction dependencies) the set is not executable
 - Hence the sentence is not interpretable

Non-island example

- *Bill saw [a picture of John]*
- **Who** did Bill see [a picture of ___]?

update *b*:

<i>p</i>
see (<i>b</i> , <i>p</i>) picture (<i>p</i>) of (<i>p</i> , <i>j</i>)
find <i>b</i>: <i>b</i>
bill (<i>b</i>)
find <i>j</i>: <i>j</i>
john (<i>j</i>)

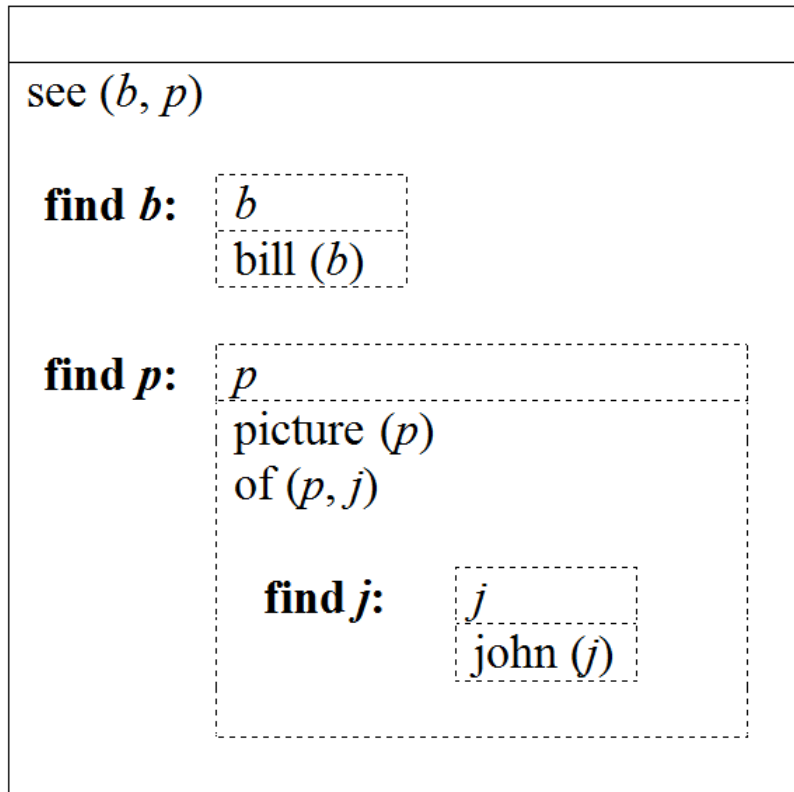
retrieve *w*:

<i>w</i> , <i>p</i>
see (<i>b</i> , <i>p</i>) picture (<i>p</i>) of (<i>p</i> , <i>w</i>)
find <i>b</i>: <i>b</i>
bill (<i>b</i>)

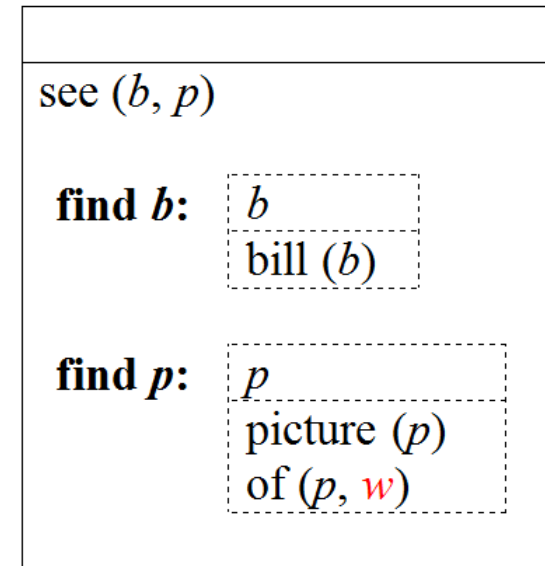
Island example

- *Bill saw [the picture of John]*
- ***Who** did Bill see [the picture of __]?

update b :



retrieve w :



Relevance violation

- *Bill [raised a son and planted a tree]*
- **Who did Bill [raise __ and planted a tree]?*

update b :

s, t
raise (b, s)
son (s, b)
plant (b, t)
tree (t)
find b: b
bill (b)

retrieve w :

w
raise (b, w)
plant (b, t)
tree (t)
find b: b
bill (b)

Conclusions

- Instructional DRT provides a unified account of backgrounded meaning within the DRT framework
 - Presupposition
 - Specific indefinites
 - Conventional implicature
- It suggests how the syntactic tree of the sentence arises out of knowledge in our mind
- It suggests an explanation why backgrounded constituents are syntactic islands

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Thank you for your attention!

Questions?

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